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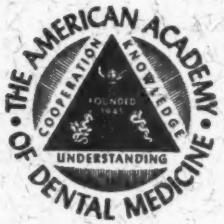

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(*Quoted from the Constitution*)

"To promote the study and dissemination of knowledge of the cause, prevention and control of diseases of the teeth, their supporting structures and adnexa and related subjects; and to foster and promote a better scientific understanding between the fields of dentistry and medicine."

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THE MANAGEMENT OF ACUTE INFECTIONS OF DENTAL ORIGIN*

LEON EISENBUD, D.D.S., *New York, N. Y.*

The management of infections of dental origin includes two phases, the surgical and chemotherapeutic. The advent of antibiotics has been accompanied by a marked decrease in cases requiring surgical intervention. The role of chemotherapy meanwhile has become increasingly important. It is the purpose of this paper to review some of the antibiotics in use at this time and to evaluate the part which these agents play in the management of acute pyogenic infections of dental origin.

THE ANTIBIOTICS

Penicillin

1. *Derivation:* penicillium notatum, a common mould. It was discovered by Alexander Fleming at St. Mary's Hospital, London in 1929. In 1940 Chain and Florey, at Oxford, isolated the active ingredient and confirmed its activity against pyogenic organisms.

2. *Properties:* a white, crystalline, soluble powder. It is stable at room temperatures, but is destroyed by heat and acid, and inactivated by oxidizing agents.

3. *Effective Against:* Gram positive organisms, including most staphylococci and streptococci. It is also extremely potent against oral spirochetes and fusiform bacilli.

4. *Routes:* topical, peroral, intramuscular, intravenous.

5. *Dosage Forms:* (recommended doses are arbitrary and may be altered according to the severity of the infection).

a. sucking troches, 5000 units each. One troche is placed in the mouth every three hours and permitted to dissolve.

b. peroral tablets, 50,000 to 500,000 units each. Average minimum adult dose: one million units per day.

c. crystalline penicillin (soluble form), in vials of 100,000 to one million units; dissolved in water or saline for injection or local irrigation. Average therapeutic dose: 100,000 units every three hours, administered intramuscularly.

d. repository forms:

1. Aqueous crystalline procaine penicillin, 300,000 units per cc. Average dose: 300,000 units twice a day.
2. Procaine penicillin in oil, 300,000 units per cc. Average dose: 600,000 units daily in one dose.
3. Procaine penicillin in oil with aluminum monostearate, 300,000 units per cc. Average dose: 600,000 units every second day.

e. fortified forms (rapid repository), combinations of procaine penicillin with crystalline penicillin.

6. *Side Actions:* allergic reactions in two to five percent of patients.

Comment: Despite the introduction of many new agents during recent years, penicillin remains the safest and most useful antibiotic available. Although topical application was a common practice at first, the increasing incidence of local allergic reactions has prompted many clinicians to discontinue the employment of penicillin in that manner. Cumulative experience has shown in addition that the optimum effect is obtained via the parenteral route.

When taken by mouth, penicillin is almost entirely distroyed by the gastric hydrochloric acid, but the addition of buffering agents has made it possible for the drug, so employed to escape inactivation in part. By using four or five times the average parenteral dose, and by administering it at times of lowest stomach acidity (at least one-half hour before or

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one and one-half hours after meals), it is possible to attain blood levels within reasonably effective limits (Case 1). There is no conclusive evidence, however, up to this time, to show that peroral penicillin is dependable enough to warrant its routine use in infections of dental origin.

On the other hand, intramuscular injection of large doses of aqueous procaine penicillin has proven to be sufficient for the control of the great majority of penicillin-sensitive infections. In more serious cases intermittent injections of acqueous crystalline penicillin every three hours may be administered to obtain the high peak concentrations which are considered therapeutically effective to the same degree as prolonged exposure of the organisms to the antibiotic. A detailed review of these and other forms of penicillin, together with their dosage schedules and indications, has been presented in a recent paper.[1]

Aureomycin

1. *Derivation:* mould streptomyces aureofaciens.

2. *Properties:* a yellow, crystalline, powder; stable at room temperatures; readily soluble.

3. *Effective Against:* Gram positive organisms, including most staphylococci and streptococci. It is also effective against many Gram negative organisms normally resistant to penicillin, as well as rickettsias, some viruses, and the oral spirochetes and fusiform bacilli.

4. *Routes:* topical, peroral, intravenous.

5. *Dosage Forms:*
   a. *troches,* 15 milligrams each. One troche is placed in the mouth every three hours and permitted to dissolve.
   b. *peroral capsules,* 50 milligrams or 250 milligrams each. Average adult dose: 250 milligrams every three hours.

6. *Side Actions:* local allergic reactions, glossitis, skin and mucous membrane lesions resembling those of Vitamin B deficiency; nausea and diarrhea; monilial infections of oral, rectal, vaginal, anal mucous membranes.

Comment: Experience with aureomycin has shown it to be a valuable agent of second choice in penicillin-resistant cases (case 2). The frequent occurrence of side actions represents a serious disadvantage, especially in the treatment of ambulatory patients. The opinion is widely expressed that in time aureomycin will be displaced entirely by new and less toxic drugs.

Chloromycetin (Chloramphenicol)

1. *Derivation:* streptomyces venezuelae, an actinomycete, and synthetically.

2. *Properties:* a white, crystalline, stable powder.

3. *Effective Against:* Gram negative bacteria, rickettsias and certain viruses.

4. *Routes:* peroral only.

5. *Dosage Forms:* peroral capsules, 250 milligrams each. Average adult dose: 250 milligrams every three hours, after an initial dose of three grams in three doses at hourly intervals.

6. *Side Actions:* headache, nausea, diarrhea, skin and mucous membrane lesions resembling those of Vitamin B deficiency; monilial infections. These toxic manifestations are similar to those reported for aureomycin, but they are much less frequently observed in the case of chloromycetin.

Terramycin

1. *Derivation:* streptomyces rimosus.

2. *Properties:* a stable, soluble yellow powder.

3. *Effective Against:* Gram positive and Gram negative bacteria, spirochetes, rickettsias, some viruses.

4. *Routes:* topical, peroral.

5. *Dosage Forms:*
   a. *troches,* 15 milligrams each. One troche is placed in the mouth every three hours and permitted to dissolve.
   b. *peroral capsules,* 50 milligrams 100 milligrams, or 250 milligrams each. Average adult

dose: 500 milligrams every six hours.

c. elixer containing 50 milligrams per cc. Average adult dose: two teaspoonfuls (10cc.) every six hours.

6. *Side Actions:* occasional allergic reactions, nausea, and vomiting.

Comment: Chloromycetin and terramycin require further trial before final evaluation. At this time it appears that they will be useful agents, especially terramycin which is singularly low in side actions and has an unusually broad antibacterial spectrum.

Streptomycin

1. *Derivation:* actinomyces griseus.
2. *Properties:* a stable, soluble, white powder.
3. *Effective Against:* most Gram negative organisms.
4. *Routes:* topical, intramuscular.
5. *Dosage Forms:* vials of dry powder, each containing one, two or five grams, dissolved in water or saline for injection or local irrigation. Average dose: one to two grams daily, by injection, in divided doses.
6. *Side Actions:* occasional nausea and vomiting; eighth nerve damage upon prolonged use.

Comment: Among the pathogens sensitive to streptomycin are many types which, through the production of penicillinase, are normally unaffected by penicillin. These organisms can be primary, or more often secondary invaders in infections of the jaws and related parts. Streptomycin may be of assistance for this reason in certain resistant cases where the administration of other agents has either wholly or partially fajled therapeutically. New forms such as dihydrostreptomycin sulfate, are decidedly less neurotoxic than streptomycin itself and may be used for short courses of treatment with relative safety. The addition of para-aminosalicylic acid has further reduced the incidence of toxic manifestations.

Tyrothricin and Bacitracin

For the sake of completeness mention is made of these two additional agents which have however very limited usefulness in managing acute infections because their application is confined to the topical route.

Tyrothricin, derived from the bacillus brevis, has many advantages which make it an ideal antibiotic for local use. It is very effective against Gram positive organisms and maintains this potency in the presence of blood, serum, and pus. It is stable at high temperatures and may be autoclaved. Free of toxicity when applied locally, it cannot be used parenterally because of a hemolytic effect on blood cells.

Bacitracin, from the bacillus subtilis, is, like tyrothricin, highly effective against Gram positive organisms and has been recommended up to this time for the packing of abscess cavities, irrigation of sinus tracts and similar local applications. It is also available and useful in the form of troches. Recently, its use parenterally, without serious side actions, has been reported.

There has been considerable evidence lately that the simultaneous use of two or more chemotherapeutic agents may be advantageous. While not all these drugs are compatible, and some are known to be antagonistic, in some cases a synergistic, that is, more than simple additive, effect is indicated. Such claims have been made for penicillin and the sulfonamides, penicillin and streptomycin, and penicillin and bacitracin.

ACUTE PYOGENIC INFECTIONS OF DENTAL ORIGIN

The vast majority of infections of dental origin are caused by Gram positive organisms, which normally predominate among the flora of the oral cavity. Since at least four of the most widely used antibiotics exert their chief effects on this group, there is available a most potent armament for the control of these conditions by chemotherapeutics. Prompt institution of chemotherapy in adequate

dosage may abort the infection and avert the need for incision. Where treatment is started late intervention to establish drainage may become necessary, but even in these instances antibiotics are of value in that serious complications may be prevented. In association with good surgical management, chemotherapy has been shown to reduce significantly the incidence of such sequelae as phlegmon of the floor of the mouth (Figure 1), mediastinitis, and cavernous sinus thrombosis.

Figure 1—Diffuse cellulitis of dental origin with invasion of the floor of the mouth requiring surgical drainage. Cases of this type were common before introduction of the antibiotics. At this time they are seldom seen, provided chemotherapy in adequate dosage is begun early in the course of infection.

Selection of Antibiotic. It would be ideal if at the outset the responsible organism, or organisms, could be isolated, identified, and quickly tested for sensitivity or resistance to each drug. Since this laboratory procedure cannot be accomplished in less than 48 to 72 hours, and since, in addition, organisms cannot be recovered initially in more than a small percentage of cases, it is necessary to resort to therapeutic trial in the selection of the antibiotic. The agent first administered is penicillin except where the patient is known to be intolerant of that drug. The customary dosage is 300,000 units of aqueous procaine penicillin, intramuscularly, twice a day. An additional 200,000 units of aqueous crystalline penicillin is given simultaneously with the first injection to achieve an immediate high blood level.

Response to Chemotherapy. The response of the dental infection during the first forty-eight hours of such therapy will depend on four factors: 1. adequacy of dosage 2. sensitivity of the organisms 3. time of administration, that is, the point in the development of the infection at which antibiotic therapy is begun 4. vascularity of the affected parts.

Adequacy of dosage is of course relative to the *sensitivity of the organisms.* Mixed infections of the mouth are the rule and some organisms are highly resistant. This resistance in many cases is due to the formation of penicillinase, an enzyne which destroys penicillin. While Gram negative bacilli, such as E.Coli, are common offenders in this respect, studies have shown that even some strains of staphylococci may produce penicillinase. It should be presumed that a portion of the penicillin will be inactivated by such organisms, and a safe therapeutic margin requires administration of very large doses in all cases.

By the same reasoning, the use of small doses is dangerous since it permits the multiplication of partially resistant forms, and invites the possibility of penicillin-fastness.

With aureomycin and streptomycin the number and intensity of toxic complications is related to the dose administered and for that reason there is a limit to the amount of these agents which may be prescribed during any given period. However, with penicillin, the occasional reactions seem to be of a true allergic character, and their incidence and severity is independent of the amount used. Very large doses of penicillin therefore may be prescribed without fear of increasing side actions.

Nevertheless, despite the administration of large doses of penicillin, approximately ten percent of infections of dental origin fail to respond favorably, and in such cases, after forty-eight hours, it is good practice to prescribe a second antibiotic, usually aureomycin. Resort to still other agents may be necessary depending on the response during the subsequent twenty-four hours.

Surgical Management. Depending on the *time chemotherapy is begun* the average dental infection follows one of several courses. Rapid complete resolution, without drainage, may be anticipated in the vast majority of cases under adequate doses, administered early in the development of the infection. (case 3). Where antibiotic therapy is begun late, a favorable though less dramatic response may be obtained, with gradual resolution. In some instances evacuation of pus may be required to obtain a cure (case 4). In a recent study by Klatell and the writer,[2] it was found that the use of penicillin in the treatment of acute alveolar abscesses resulted in a marked reduction in the number of cases requiring drainage for resolution. Pus was evacuated surgically or spontaneously in eighty percent of the cases treated prior to modern chemotherapy, whereas it was recovered in only twenty-nine percent of those receiving penicillin. It was concluded that incision for drainage may be delayed indefinitely in the presence of certain responses to chemotherapy, which may be listed as follows:

1. The temperature responds favorably.
2. The patient is alert and not toxic.
3. There is no respiratory embarrassment.
4. There is no threat of spontaneous extraoral rupture.
5. There is no obvious danger of extension into the pharynx or venous sinuses.

Extraction during the acute phase of infection. The introduction of antibiotic therapy has been marked by a significant reversal of attitude regarding this problem. Previously, controversy revolved entirely around the question of risk involved in removing the tooth to establish drainage. Now, emphasis has shifted to the development of methods of avoiding extraction, since it is possible to control acute infection and retain the offending tooth until acute manifestations have subsided, at which time root canal therapy may be instituted. Experience has shown that after proper endodontic treatment periapical lesions may be expected to heal, generally without root resection or apical curettage, although these procedures may be applied when necessary. In the case of lateral, or paradontal abscesses, modern periodontal techniques have made it possible often to retain such involved teeth as well. This is especially true in diabetics, where acute infections are prone to arise from teeth with relatively shallow pockets.

In some instances, if the prognosis of the tooth is hopeless, or where its retention for future service is not important, a cure may be obtained by exodontia alone during the very early stages of infection. However, it has been shown that the post-extraction infection is inclined to be more severe and invasive than the primary abscess. This is most noticeable in the relatively avascular region of the permanent mandibular molars, where the great majority of serious postoperative infections arise (figure 2). Except in the deciduous dentition, where immediate extraction under general anesthesia is an acceptable procedure (figure 3), manipulation is attended by some risk of incurring more widespread involvement, despite the increased margin of safety which may be afforded by the simultaneous administration of antibiotics.

Case 1. (The effective use of peroral penicillin)

An acutely ill eighteen year old male, a known hemophiliac since the age of three weeks, was admitted to the hospital with swelling of the right infraorbital region extending upward to the eyelids, which were edematous, ecchymotic, and completely closed (figure 4). The upper

Figure 2—Extensive infection following the removal of an impacted lower right third molar. Postoperative infections are inclined to be more severe and invasive than primary abscesses, especially in the relatively avascular region of the permanent mandibular molars.

Figure 3—Early acute alveolar abscess originating from the lower left second deciduous molar. In the primary dentition, immediate extraction, under general anesthesia is an acceptable procedure and generally is followed by resolution of infection.

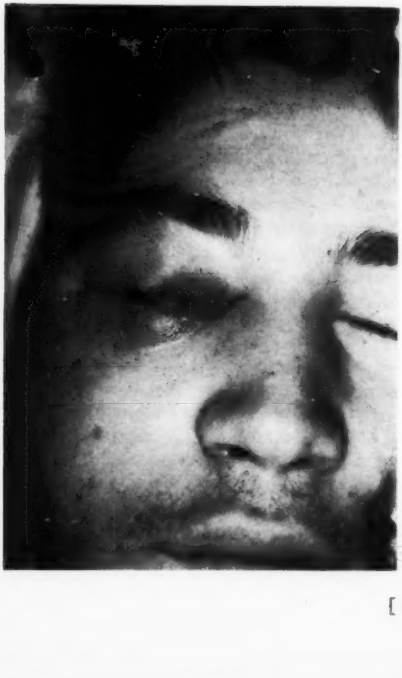


Figure 4—Acute alveolar abscess in an eighteen year old hemophiliac. Intramuscular penicillin was discontinued because of bleeding at the sites of injection, but the infection was controlled with large doses of orally administered penicillin. Root canal therapy was successful later on in averting extraction.

right first bicuspid was sensitive to percussion and the mucobuccal fold in this region was elevated and tender. Temperature was 100.6°F., white blood count 16,000, coagulation time three hours.

Intramuscular penicillin was started but when hematomata developed at the sites of injection, oral administration was substituted, 150,000 units every three hours. The patient was given whole blood transfusions and antihemophilic globulin. The root canal of the offending tooth was entered and a dressing placed.

During the ensuing week the temperature responded favorably and the acute infection resolved. The clotting time however remained abnormally prolonged and it was felt that the patient was inadequately protected for surgery. He was discharged completely recovered, and later on root canal therapy was completed under the protection of penicillin.

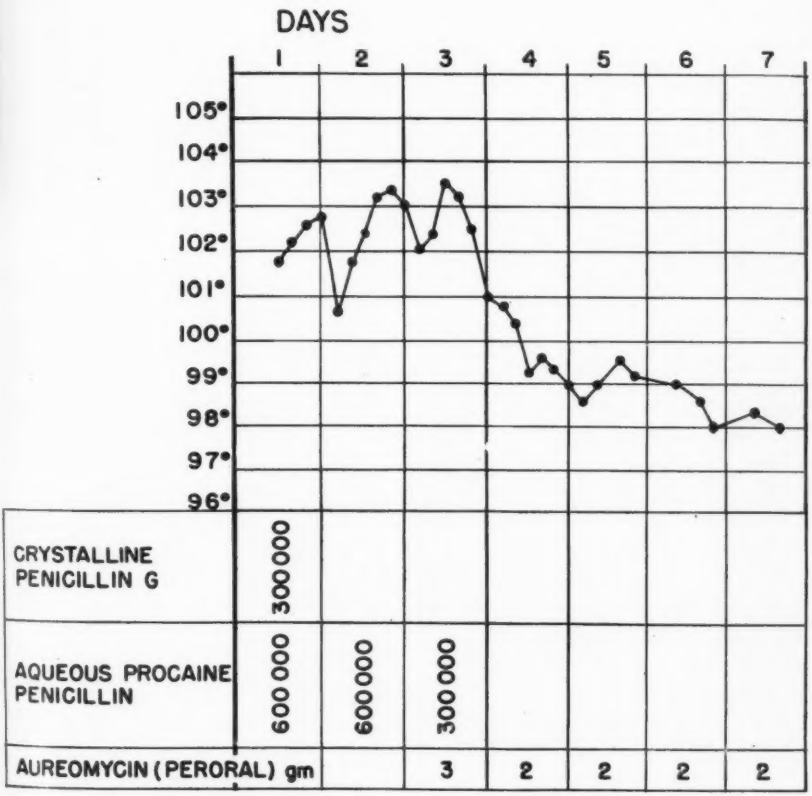


Figure 5 Dental infection which failed to respond to the administration of penicillin, but resolved rapidly when aureomycin therapy was begun. Aureomycin has proven to be a valuable agent of second choice in penicillin-resistant cases.

Case 2. (Dental infection resistant to penicillin but sensitive to aureomycin)

A thirty year old female was hospitalized with an alveolar abscess originating from the lower right second bicuspid. Five days before, root canal therapy had been instituted; the following day swelling arose over the mandible which gradually extended backward and downward into the submaxillary area and across the midline. Temperature rose to 102° F. and remained elevated despite the administration of large doses of penicillin. At admission the floor of the mouth was raised and edematous, and there was marked trismus. 300,000 units of aqueous crystalline penicillin were injected intramuscularly, and 300,000 units of aqueous procaine penicillin, twice a day, were ordered. Despite this regime, the temperature rose to 103.6° F. (figure 5) and the swelling increased during the first two days of hospitalization. At this point, penicillin was discontinued and oral aureomycin was begun, two grams initially, followed by one-half gram every six hours. A dramatic drop in temperature ensued, and within twenty-four hours the patient was afebrile. Swelling and trismus likewise diminished rapidly. One week later, under the protection of aureomycin, root canal therapy was resumed and completed.

Case 3. (Typical penicillin-sensitive infection resolved rapidly by chemotherapy)

A seventeen year old male was admitted to the Dental and Oral Surgery Service with an acute alveolar abscess originating from the upper right first molar. A massive, firm swelling was seen on the right side of the face, extending inferiorly to

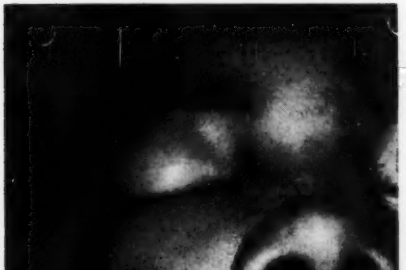
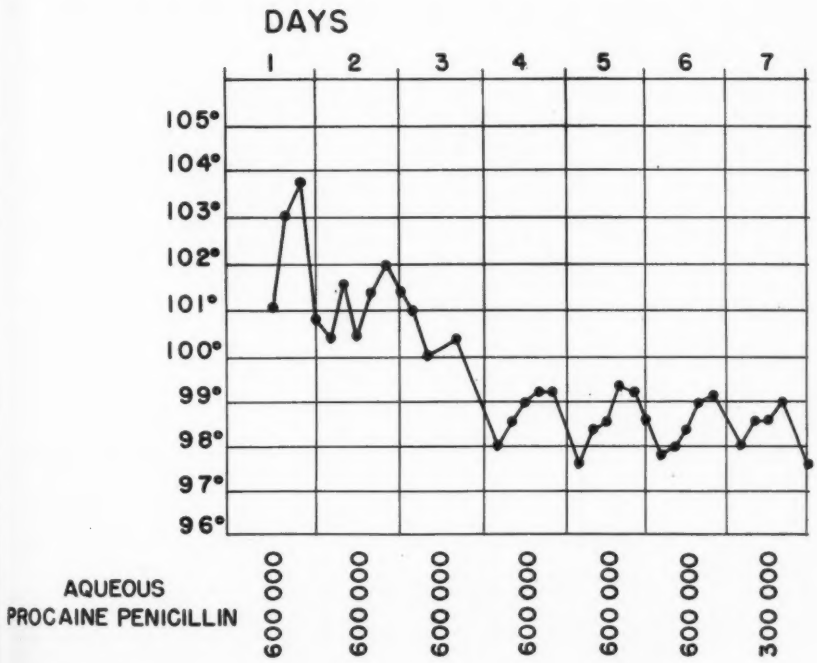


Figure 6a—Acute alveolar abscess which responded rapidly to intramuscular penicillin therapy. Rapid complete resolution may be anticipated in the majority of cases where antibiotics are administered in adequate doses early in the course of infection.
On admission, a massive firm swelling was present, with periorbital edema.

Figure 6b—After three days of chemotherapy the swelling had subsided and the eye was open.



6c. *Temperature responded favorably within 48 hours and reached normal limits on the third day of hospitalization.*

the lowed border of the mandible, medially to the naso-labial fold, and superiorly to the inner acanthus of the eye, with periorbital edema (figure 6*a*). The mucobuccal fold opposite the involved tooth was distended and tender to palpation, but there was no evidence of fluctuation. Temperature was 101° F.

Chemotherapy was instituted, consisting of 300,000 units of aqueous procaine penicillin intramuscularly twice a day. Temperature rose to 103.8° F. the first evening (figure 6 *c*) but started to decline the following morning and by the third day of hospitalization, the patient was afebrile. At this time swelling had subsided almost to normal and the right eye was completely open (figure 6 *b*). Complete recovery ensued, and one week after admission the offending tooth was removed and the patient was discharged.

Case 4. (Resistant dental infection requiring drainage for resolution)

A thirteen year old female was admitted to the hospital with a chief complaint of pain and swelling of five days' duration. A diffuse swelling of the right side of the face extended posteriorly to the angle of the jaw and downward below the lower border of the mandible. 300,000 units of aqueous procaine penicillin had been administered the day before but the infection had failed to respond. The patient appeared dehydrated and toxic; temperature was 100.2° F., white blood count 17,500 The lower right first molar was broken

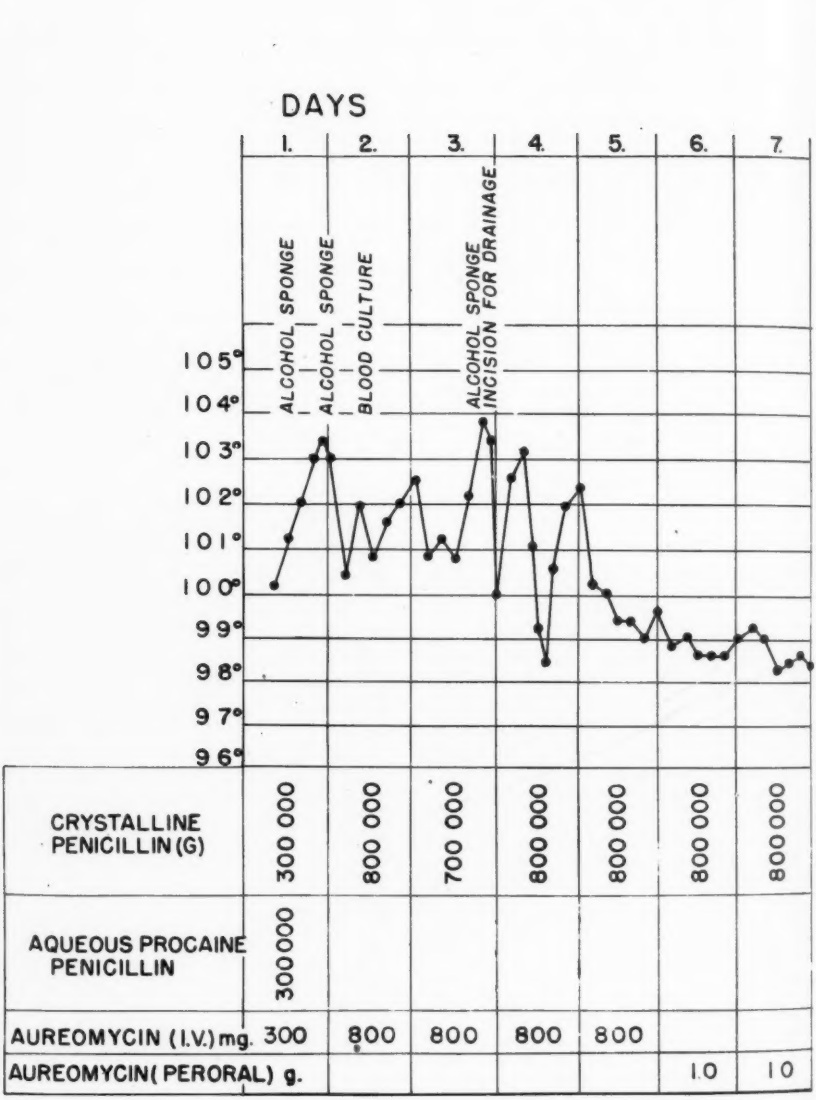


Figure 7 Resistant dental infection which required incision for drainage to effect a cure.

down and adjacent mucobuccal fold was elevated; there was marked trismus.

Despite the administration of large doses of aqueous crystalline penicillin, the temperature rose after hospitalization to 103.4° F. (figure 7). Aureomycin was started, 200 milligrams intravenously every six hours, and an intravenous infusion of 5% glucose in saline was applied. The condition nevertheless remained the same and on the third hospital day an incision for drainage was made in the mucobuccal fold opposite the lower right first molar. Following this, the temperature dropped and swelling began to recede. Intravenous aureomycin was discontinued and the patient was given instead, 250 milligrams by mouth, with fifty milligrams of dramamine every six hours to control nausea.

After ten days of hospitalization, the patient had fully recovered and the responsible tooth was extracted under conduction anesthesia.

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(see page 58)

PRENATAL AND POSTNATAL INGESTION OF FLUORIDES
*A Preliminary Report**

REUBEN FELTMAN, D.D.S., *Passaic General Hospital, Passaic, New Jersey*†

INTRODUCTION

There is very little to be found in the literature regarding studies of controlled series in humans of supplemental fluorides during the formative stages of tooth development. Much research has been undertaken, is underway and will continue for years on this most interesting subject in order that we may attempt the control and partially prevent this most common affliction of mankind—namely, Dental Caries. It is the aim of this study to determine whether the ingestion of a salt of fluorine taken during gestation[9] and during the first eight years of life is of value in the reduction of the incidence of dental caries in man.[6,1,2] Inasmuch as our program is in its infancy, this is to be considered a preliminary report.

HISTORICAL DATA

There is a great deal of data to be found in the literature apparently proving the importance of the inclusion of fluorine in the teeth for the partial prevention of the high incidence of dental caries. It is not our aim to review the entire literature, but it is of value to cite the following:

Brissemoret[7] reported in 1908 that calcium fluoride was an important factor in bone nutrition and in cases of rampant dental caries. He reported good results:

Gettler[14] found after numerous analyses at postmortem that the fluorine content of bone and teeth averaged 0.03% to 0.01%, showing a storage of small quantities.

Armstrong and Brekhus[1] found that the fluorine content of enamel of sound teeth was 0.0111%. The fluorine content of carious teeth was 0.0069%—or twice as much fluorine was present in sound teeth as compared with that in carious teeth.

Martin[17] from the Evanston dental caries study found the average fluorine content of non-carious teeth to be 0.0202% as compared with 0.0133% in carious teeth—again approximately twice as much fluorine in non-carious teeth as compared with the carious teeth.

As a result of studies by McKay[20] and G. V. Black, it has been stated that certain facts have been established, namely:

> "1. Lesions affecting the integrity of the structure of the enamel can be produced only during the period of calcification and not thereafter.
>
> "2. No self-repair of the enamel is possible during the calcification period nor afterwards.
>
> "3. Fluorine is the only agent ordinarily included in diet that is capable of exerting a modifying influence on the structure of the enamel.
>
> "4. Dietary elements are incapable of producing any alteration of the enamel after calcification has been completed."

It is the opinion of investigators[2] that inasmuch as relatively slight amounts of fluorine are present in "mottled enamel" which give such a profound change to its property—namely, resistance to dental caries, then it is logical that if minute optimum quantities of this element be incorporated into the enamel, it might produce the resistance to caries without the unsightly appearance developing as when excessive quantities are ingested. The marked changes in the properties of enamel accompanying changes in the fluorine content[1] resulted in expressions by various clinicians interviewed that the incidence of caries in teeth, if the physiological effects of fluorine ingestion is slight to moderate, is greatly reduced.

Arnold[5] has determined after thorough studies in Aurora where the water natu-

* Since the preparation of this paper, a grant in aid has been received from the Federal Security Administration.

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rally contains 1 PPM of fluorine that only a small amount of fluorine is necessary to acquire the desired effect and that children born and reared in such an area would show a changed caries rate, and that the mildest type of dental fluorosis that might occur is inconsequential.

If results such as these are to be expected, then the addition of controlled optimum quantities of fluorine in the dietary regime, where fluorine is absent, is sound practice.

A study made in Sheboygan and Green Bay,[16] where the water naturally contained fluorine—2.3 PPM in Green Bay and 0.05 PPM in Sheboygan—produced the following statistics:

3 times as much caries in permanent teeth in Sheboygan as compared with Green Bay.

4 times as much caries in the deciduous teeth in Sheboygan as compared with Green Bay.

30% Green Bay children had no caries experience in permanent teeth as compared to 3% in Sheboygan.

60% of Green Bay children had no caries in deciduous teeth as compared with 20% in Sheboygan.

Results from studies in areas where fluorine is naturally present in the water all report the lowered incidence in the rate of dental caries as compared with those areas where it is absent.[3,5,13,22,16,20] Studies are underway in widely separated areas in the country to determine whether the same results can be expected when the water is artificially fluorinated. There has been no conclusive report from these areas, since the studies have not been in operation for a long enough period to evaluate their findings.

MATERNAL TRANSFER OF FLUORINE

Most of the research in this field has been done on animals[9,18,8], rats being the one used in the majority of the studies. It has not been definitely established that caries in humans and caries in rats are the same entity, but a few illustrations of the results will be cited.

Prenatal feeding of 0.05% fluoride resulted in a significant quantity of fluorine acquired by the newborn.[18] Young rats suckled by mothers receiving the same quantity—0.05% fluorine—acquired the element through the milk so that their bones and teeth contained thirty (30) times as much fluorine as the controls. Murray feels that mottled temporary teeth in humans may result from prenatal maternal fluorosis and the human and other milk in areas where fluorine is present in water contains fluorine in amounts which may be biologically effective, although perhaps too small for detection chemically or spectroscopically.

Fluorine reached the young animal by strictly physiological routes; namely, placental and mammary transmission is the conclusion from a study[10] and results from another show indications that the fluorine passed through the placenta and was incorporated in the teeth.[11] In a study done by using trade waste of the milk industry[9] containing fluorine, a reduction in the caries incidence was found, after giving the substance during pregnancy and during lactation.

In humans it is well known that the foetus is fed and nourished through the maternal circulation via the placenta. Warner[28] states that all the required food elements for the growth of the foetus, whether they are carbohydrates, proteins, fats, vitamins or minerals, go through the placenta into the foetal circulation. The principle minerals in the human body are calcium, phosphorus, potassium, sulphur, chlorides, magnesium and iron. There are traces of several other minerals, among which is fluorine. He states that fluorine does go into the foetal circulation, although it is not comparable in importance to many, if not most of the others.

Okerse[22] is of the opinion that the ingestion of fluorine in optimum quantities and a high protein intake during gestation and lactation may prove extremely effective in the reduction of the high incidence of dental caries in the future and may serve a better purpose than the adding of fluorine to the communal water supplies.

A study made in an orphanage[27] resulted in the conclusion that fluorapatite

can be laid down as such during the calcification of the teeth and so, after their eruption, the teeth would be relatively immune to dental caries. This study was made on an inconclusive number of patients—but is of much interest.

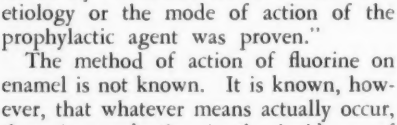
Mottling of the deciduous teeth has been reported from time to time.[18,20,26]

MODE OF ACTION

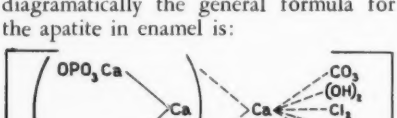
Deans' quotes following the reading of a paper by Gruebbel[15] states, "It is not essential that the mode of action of fluorine be known before setting up test studies. Preventative medicine utilized observed natural phenomena as a basis for far reaching control measures years before the laboratory provided the scientific explanations of the phenomena. The conversion of Jenner's observations of the protective influence of Vaccinia Virus in Smallpox prevention rested on the purest empirical grounds for a century. For generations Scurvy and Malaria were effectively controlled before either their etiology or the mode of action of the prophylactic agent was proven."

The method of action of fluorine on enamel is not known. It is known, however, that whatever means actually occur, there is a reduction in the incidence of dental caries when it is applied to the structure.

The major component of enamel is hydroxyapatite.[23] It is believed that diagramatically the general formula for the apatite in enamel is:



Flourine, having a marked affinity for calcium,[23] tends to throw off and replace one of the radicals of the hydroxapatite molecule to form calcium fluorapatite, as illustrated by the diagram:



This product is less soluble in organic acids than hydroxyapatite. Following topical application of sodium fluoride, the electon microscope and the Roentgen ray diffraction seem to point to a chemical change of the enamel.[24]

Can we accomplish the same by having the fluorine present in the blood stream and in the organic matrix during the calcification period of the enamel?

Schour and Smith[25] reporting on the action of fluorine on the calcium phosphorous metabolism state that no measurable disturbance in this metabolism in human subjects nor dogs was found. From their experiments they felt that fluorine exerts its effect by a direct and a specific action upon the highly specialized tooth forming cells and not by a generalized disturbance of the body's ability to utilize calcium and phosphorous.

Bellinger[6] states that if any benefit is to be obtained by the use of fluorine, it must be used during the first eight years of life. Cox, et al,[9] Dean[12] and Armstrong and Brekhus[2] produced evidence that a great reduction in the incidence of dental caries can be produced by supplying food and water with an optimum amount of fluorine during the formative period of the teeth. Cox, et al[9] feel that whatever the mechanism of the relative prevention of dental decay by fluorine, whether the resistance is as a result of chemical, organic or combinations of these factors, it seems evident that caries resistance can be built into enamel. They predict that a structure resulting from the lack of fluorine will be found which will differ from the "enamel" and that, therefore, the effect of fluorine is one of modification of the structure to a more resistant form.

AUTHOR'S VIEWS—METHODS & MATERIALS

If the action of fluorine, whether it be ingested by means of naturally fluorinated water or by the use of fluorine acquired through tablet form or through foods rich in fluorine, renders its influence as a result of a chemical or an organic influence during the phases of organic matrix

formation or calcification,[20,25,21] we should be in a position to report either favorably or unfavorably the results obtained in our series of cases. The plan is to run our cases to a number which will be of statistical value with children born to date and many more years of continuation of the project. The figures obtained should be of high enough value to compensate for those we will lose as a result of migration from our area and other reasons for calculated loss.

Controlled amounts of fluorine daily, without regard to water intake, where the water is fluorine free, is the project under study at our institution. Since 1948, 309 children have been born to mothers who have ingested tablets containing two or four mgms. of calcium fluoride daily. At the time of this paper, sodium fluoride 2-21 mgms. daily is being used as well. A series on children is also being studied. Two mgms. of calcium fluoride daily is being given to children from the age of two weeks to two years. Four mgms. of calcium flouride daily is being given to children over two years of age through the eighth year. We are starting to give sodium fluoride at the present time. Some of the children who were born from mothers who ingested the fluoride during pregnancy have been examined. The results to date are most heartening—the numbers are too small and the ages too young to be of importance at this stage of the investigation.

This much can be reported at this stage of the investigation. The caries rate in three year olds in this area is two decayed teeth. Caries has been found in only one child, these on the anterior teeth only. This child holds gum drops in this area most of the time. There are no deep grooves nor fissures discernable on any of these children as compared with controls. The enamel has the appearance of the inside of an oyster shell—highly polished and pearly. Upon exfoliation of these teeth many different types of examinations will be done in order that as complete an understanding of the structure may be presented and studied.

We have applied for assistance for the establishment of a biochemical and histopathological laboratory where we hope to examine and test tooth buds, teeth, placental tissue, cord blood, etc., obtained at delivery from normal cases, miscarriages, stillborns, etc. We hope to be able to report interesting and vital statistics from this phase of our project with histological and biochemical reports. When we explore further in the next few years, we may be able to determine the manner of action of compounds of fluorine as drugs for combatting and partially preventing dental caries.[8]

COMMENT

Ample data has been compiled from the literature to lend feasibility to the theory that fluorine ingested during pregnancy and during the formative years of tooth development will cause a reduction in the incidence of dental caries.

We may be able to develop an enamel which will be chemically different from the structure we ordinarily see[9,1,7,22,19,8]—namely, one which will be of calcium fluorapatite rather than the hydroxyapatite which is so readily susceptible to decay in our dietary regime of today.

Cox, et al,[9] Dean,[12] Armstrong and Brekhaus,[2] Schour and Smith,[25] McKay and G. V. Black,[20] Nuckolls, et al[21] and others, as a result of their work, lend credence to the theory that the use of fluorine during the formative and developmental years of life is of importance in acquiring caries resistant enamel.

The addition of a salt of fluorine[19] appears to be a rational approach to the problem, especially in our area where the water is fluorine free and the incidence of dental caries is high.

Clinical evidence as to the validity of this opinion will be available in the next few years. At the time of the preparation of this paper, 309 children have been born whose mothers ingested a fluoride during the mothers' pregnancy. 156 children from age two weeks to eight years are using a fluoride tablet at present. More are being added each week until such time as we have sufficient number to properly report the findings.

In this preliminary report on the research project underway at our institution, I have tried to rationalize our procedure. Pertinent references to the article have been referred to and quotes borrowed from many. Controlled studies on humans are not difficult if the patients are available and cooperative, but the results, if deleterious, are frought with dangerous repercussions. For this reason, the drug of choice had been calcium fluoride rather than sodium fluoride. Sodium fluoride is now being given to those patients whom we think will follow instructions in order to prevent deleterious results, namely, effects of overdosage.

SUMMARY

1.) The study in operation at the Passaic General Hospital has been explained.

2.) It has been shown that the presence of optimum quantities of fluorine naturally present in water and in foods causes a reduction in the incidence of dental decay.

3.) Evidence has been produced that changes occur in the incidence of dental caries when the fluorine content of the enamel of the teeth is higher as compared to the teeth whose fluorine content is low.

4.) It is shown that experimentally fluorine passes through the placenta into the foetal circulation.

5.) Flourine is the only agent present in the diet that is capable of producing an influence on the structure of the enamel during formation, and dietary elements in the form of minerals in prevention of caries are valueless after calcification has been completed.

6.) Flourine may prove to be a drug of value in the prenatal and postnatal first eight years of life dietary regime for the partial prevention of dental caries.

7.) We agree with McClure[19] in stating that the importance of preventative effects of fluorine on dental caries suggests that serious thought be given to the use of the optimum quantity of supplemental fluorine in the children's diets for the partial control of dental caries.

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THE TEMPOROMANDIBULAR JOINT SYNDROME VIEWED FROM THE PSYCHOSOMATIC STANDPOINT*

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In the development of the psychosomatic approach to the study of disease three stages can be distinguished:

First came the breaking up of the rigid patterns of the mechanistic physico-chemical concept of disease. The second stage involved the building of a bridge between theory and reality (gastric ulcer and ulcerative colitis) in their relation to the psychosomatic view of disease. The third stage in which it is now, is concerned with replacing the bridge and fitting the parts (psyche and soma), perfectly together.

This implies finding the exact mechanism by which the psyche and soma reciprocate in health and disease. It is, indeed, a difficult task, and much research remains to be done before we may expect to find a solution to the problem. The research should be directed toward new discoveries in biochemistry and biomechanics on the one hand, and toward a more profound knowledge of the psychodynamics at higher levels in complicated human situations. A thorough knowledge of the interdependence and interplay of these factors will aid us greatly in diagnosis of diseases. Particularly does this hold true with regard to the temporomandibular joint syndrome of which we know so little.

The joint disturbances may be divided into three classes:

1. Those caused by various types of malocclusions and malrelations of the mandible to the maxilla;

2. Those that represent local manifestations of general conditions (arthritis, rheumatism, etc.)

3. Those engendered by psychogenic causes.

The physicians and dentists themselves sometime inoculate the patients with some of the symptoms in this third class.

The greatest number of patients with joint disturbances fall into the first class. A small number, relatively speaking, would fall into the second class. The number of patients of the third type, afflicted with this syndrome, varies greatly with prevailing social conditions. Thus, in times of stress and strain such as war periods or economic crises, the temporomandibular joint syndrome is much more common. Since we are presently mainly interested in the latter group of patients, this discussion as well as the presentation of case histories will be limited to the psychogenic group. And in order to correctly diagnose functional illness, the diagnosis must be established not simply by exclusion of organic disease, but by its own characteristics which one discovers in a study of the total personality of the patient. Most of these patients manifest neurotic tendencies in their manner of speech and general behavior. They are afflicted by fear and anxiety and are thoroughly self-centered. Their ills, factual and imaginary, are greatly magnified and these patients are extremely prone to suggestion. Easy as it is to inoculate them with an imaginary disease, so difficult is it to talk them out of it. Their outlook upon life is characterized by morbidity and frustration. Their temporomandibular joint pain and discomfort run parallel to aggravation of conditions in their environmental situations. It suffices to plant a seed of suspicion in their minds and they will magnify it a thousand-fold just so that they have something to talk and worry about. With this type of patient, the doctor is to be particularly careful in the choice of his words. It is in this domain that dentists and plastic surgeons are guilty of more *faux pas* than other colleagues of the healing profession. The dentist, anxious perhaps to consummate arrangements with the patient, will resort to showing samples of dentures with

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white pearly teeth. The plastic surgeon, on the other hand, with the same objective in mind, will display before-and-after treatment photographs of patients. This in itself is frequently a source of grave frustrations for the patients. This is so, because the mental picture created in the patient's mind by the generous display of samples and photographs and the practical results derived from the treatment are in most instances incomparable. This leads to disappointment. The danger inherent in painting rosy pictures and making excessive promises to patients can be understood most clearly if we realize the nature of the interrelationship between physiological function and mental processes, and also the interrelationship manifested between physiological needs and their respective psychic representations. This is basic and most essential if we are to achieve individualization and integration of diagnosis and treatment. The psychic representations conjured up by such needs are the same in all persons. The food or beverage a hungry or thirsty person thinks of depends on his social milieu, his personal habits and tastes and his alimentary experience. Similarly, the image of the desired sexual mate will be determined by corresponding conditioning factors. Yet all of these different psychic representations are evoked by an identical physiologic process in the case of each type of need. This vital factor of individual psychic differentiation must be carefully taken into consideration when eliciting information from a patient for diagnostic purposes. It is equally important to our effort to carefully enlighten the patient with regard to the diagnosis and possible prognosis. We may easily implant undesirable concepts in the patient's mind if we fail to evaluate carefully *his* psychic representation that *our* statements project into the patient's mind. That is why so much danger lurks in exhibiting ideal preview samples in dentistry or plastic surgery. Reality so often falls short of the image wrought by the dentist's or surgeon's suggestion that disappointment and frustration must ensue. Similarly, in questioning patients about their symptoms and complaints, we must exercise caution not to inoculate them by suggestion with symptoms they have never before actually felt. The psycho-physical processes that are going on in a human being at a given time and under a given set of circumstances, may be of such a nature as to make him an easy target for suggestion. The patient may thereupon begin to experience symptoms that he never before was aware of. I have known patients who have never experienced any pain or discomfort in the temporomandibular joint area; until having had only a few sessions with men who overemphasize bite raising (not to be confused with mouth rehabilitation) commence to experience symptoms in and about the joint. Obviously, it is not always an accidental coincidence. These symptoms, we must conclude, have been introduced to the patients by the physician or dentist through his inappropriate and thoughtless suggestive remarks. This, however, does not mean that we can afford, at any time, to dispense with interrogating about subjective symptoms. By the latter we understand any physical pain or discomfort, mild or severe, or any feeling of mental disturbance associated with anxiety and worry. These data, obtained from the patient, are very essential and valuable if we are to make a correct diagnosis. The problem here is the proper manner of approach and procedure. The latter has to be determined in each case by a careful observation of the patient's emotional state. As a matter of fact, the patient's mental state alone, may at times, constitute the predisposing cause for a pseudo-temporomandibular joint syndrome.

CASE HISTORIES

Miss B., 28 years of age, complained frantically of pain and a feeling of crepitation in both temporomandibular joints. A careful clinical examination revealed no valid reasons for such complaints. The condyles were performing all possible excursions in direction as well as in magnitude as efficiently and smoothly as could be expected. A careful history taking brought to the fore an important psycho-

genic factor. This girl, a factory worker, had never been aware of any discomfort in her temporomandibular joints until working for sometime next to a new girl, who frequently complained of such pain resulting from wide opening of her jaws as in yawning and laughing. One morning, in a laughing spasm, her jaw locked in a wide open position and she was unable to close it. She was taken, in this condition, to a neighborhood hospital. The same afternoon, Miss B. appeared in the office in a frantic condition. Examination revealed nothing of a pathological nature in her joints, and she was assured to that effect. She was further given to understand that her anxiety and emotional tension were not in the least justifiable and that the pain sensations that she seemed to experience might probably be explained as *organ reaction* to emotional tension. On leaving the office, Miss B. said that she no longer felt pain in her joint and that she realized then that she had been frightened by the sight of her friend's affliction. She related the same story to patients in the waiting-room, warning them not to become panicky if confronted with a similar experience. Two subsequent check-ups within a year and a half discovered no symptoms of any disturbance in her temporomandibular joints clinically or roentgenographically.

Another case of a similar nature but of a different slant is that of Mr. R., 54 years of age. To all appearances, an emotionally unstable woman. Her complaint was of dull but continuous pain in her left joint. Clinical examination revealed that the second and third lower molars on the left side had been extracted many years back. The corresponding upper molars with their alveolar process extruded to a point as to make contact with the mucosa of the lower alveolar process. A careful study of the occlusion, condition of the periodontal structures, patients' facial contour, free way space and the general state of oral hygiene, pointed in the direction of conservative treatment. The clinical and roentgenographic examination of the temporomandibular joint structures revealed no pathology whatsoever except for a very slight clicking sound in the left joint of which the patient was not at all conscious. Most careful not to awaken in the patient any awareness of this trivial clicking sensation, we proceeded with the case history. Mrs. R. had been under the care of one dentist for many years. He had been taking good care of her, and she was highly satisfied with his services. Her sister was under the care of a dentist, who was practicing bite raising as a routine procedure. He was in a habit of delivering lengthy lectures to his patients on the importance of bite raising as a preventive measure against temporomandibular joint disturbances. The sister relayed one of these lectures to Mrs. R. and the latter began to experience "something" like a dull sensation of pain in the left temporomandibular joint. Bite raising was definitely contradicted in this case in spite of the fact that a slight abrasion of the occlusal surfaces of the teeth was in evidence. Mrs. R. was told then that she had a great deal to lose and nothing to benefit from bite raising. That her slight sensation of pain in the left joint was probably of a very temporary nature. Moist hot applications to the area of the left joint were advised for three evenings before retiring. After the first application the patient reported by phone that all pain was gone. Under observation for the last three and a half years, the patient has had no recurrence of any disturbance in either of her mandibular joints. In deciding between the "magic" of one moist application and an hypothesis that this particular sensation of pain was probably of psychogenic origin the reader is afforded full freedom of choice.

A third case was that of a woman 45 years of age. She had one son, was separated from her husband for a number of years and finally divorced him. Her son at the age of 19 married a girl for whom the mother-in-law had profound contempt. The mother did everything in her power to bring about a divorce of the young couple but was unsuccessful. One day, in despair, she related to her son a malicious gossip to the effect that his wife was disloyal to him. He ran out of the house in

a state of rage. The mother, realizing that she had told an untruth, and witnessing the effect it had upon her only son, became alarmed and distressed. "I wish I had lock-jaw before I uttered those words" she reported having said. A few minutes later she called and said, (with her teeth clenched) that she must see me at once as she was unable to open her mouth. An hour later, she was sitting in the dental chair and with a mouth mirror at her lips was asked quite casually, to open her mouth. She did, to her great surprise, and then related the above story.

There are a number of similar cases on record, perhaps not as spectacular as these, but which are so convincing that in diagnosing temporomandibular joint disturbances the total personality of the patient should never be lost sight of.

A word of warning is timely here: to be mindful of the patient's total personality instead of just treating an organ, does not imply lesser attention to the physical health of patients. A psychosomatic fad is as undesirable and dangerous as any other type. We must guard against looking upon complaints as based on imaginary ills, into which our patients have talked themselves, so that all we have to do is to talk them out of those troubles. We must have a clear realization of the fact that pain does not come from a vacuum and illness is not deliberately talked into oneself by a patient. When a patient complains that he experiences pain in his temporomandibular joints and on examination we are unable to disclose classical physical symptoms to justify such complaints, it does not necessarily mean that the patient is a "crank." Any and all diseases have predisposing and precipitating causes. In the greatest majority of cases, the so called obscure conditions are obscure because of our inadequacy in biochemistry and physical diagnosis. We must double our efforts in the direction of biological and psychological research.

The interrelationship between the state of the psyche and the biochemistry of the body can be best explained by quoting Freud. Speaking about methods of averting pain and making oneself insensible to painful sensations he states. "The crudest of these methods of influencing the body, but also the most effective, is the chemical one; that of intoxication. I do not think anyone entirely understands their operation, but it is a fact that there are certain substances foreign to the body which when present in the blood or tissues, directly cause us pleasurable sensations, but also so change the conditions of our perceptivity that we become insensible of disagreeable sensations. The two effects not only take place simultaneously, they seem to be closely bound up with each other. But there must be substances in the chemical composition of our bodies which can do the same, for we know at least of one morbid state, that of mania in which a condition similar to this intoxication arises without any drug being absorbed." To learn better to understand the mechanism by which certain psychic phenomena modify the body chemistry and the way in which the body chemistry affects the workings of the psyche one must espouse the psychosomatic approach in diagnosis and treatment of disease.

CONCLUSION

Since in the case histories cited above the emotional conflicts arose in the patient's relationships with other human beings, the personality of the patient becomes the object of therapy. Hence psycotherapy carefully and properly administered, rather than bite raising, is the best antidote for the temporomandibular joint syndrome in such cases.

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Table Clinics and Essayists
Saturday, June 23rd, 2:30 P.M.

ESSAYISTS

1. ELI D. GOLDSMITH, B.S., M.A., Ph.D.
   "Anti Metabolites—A Study in Basic Research and Clinical Applications." Dr. Goldsmith is Associate Professor of Histology; Research Coordinator, College of Dentistry; Associate Professor of Anatomy, Graduate School of Arts & Science, N.Y.U.

2. JOHN A. KOLMER, M.D., M.S., D.P.H., Sc.D., LL.D., L.H.D., F.A.C.P.
   "Antiobiotics." Practical Aspects of Antibiotic Therapy. Dr. Kolmer is Professor of Medicine at the School of Medicine & School of Dentistry of Temple University. Director of the Research Institute of Cutaneous Medicine. Formerly Professor of Pathology & Bacteriology at the Graduate School of Medicine of University of Pennsylvania.

TABLE CLINICS

1. S. I. ECHIKSON; M.D.
   "Oral Manifestations of General Medical Diseases."

2. WM. HARRIGAN, M.D., D.D.S., *Professor of Oral Surgery, N.Y.U.*
   "Diagnosis of Oral Medical and Oral Surgical Lesions."

3. S. C. MILLER, D.D.S., F.A.C.D. F.A.D.M. and GEORGE J. WITKIN, D.D.S.
   "Presentation of Cases of Oral Diseases by Three Dimensional Photography."

4. SIDNEY REISNER, D.D.S., and SIDNEY SORRIN, D.D.S., F.A.D.M.
   "Interdependence of Orthodontics and Periodontics."

5. S. SIGMUND STAHL, D.D.S.
   "Dental Considerations in Patients under Cortisone and ACTH Therapy."

6. D. J. STOLZENBURG, D.D.S.
   "Psychosomatics and Suggestion Therapy in Dentistry."

Program of Events

FRIDAY, JUNE 22	SATURDAY, JUNE 23		SUNDAY, JUNE 24
	8-9 A.M. Breakfast		8-9 A.M. Breakfast
	9 A.M. Business Meeting	Program for Ladies and Children	
	10 A.M. Business Meeting		10 A.M. Round Table Discussion & Clinics
	11 A.M. Business Meeting		
	12 M. Business Meeting	Luncheon	12 M. Dinner Awards, etc.
1 P.M. Registration Special Function & Reception Committees will Meet		Luncheon	
	1:30 P.M. Luncheon		2 P.M. Summaries of Morning Program
	2:30 P.M. Presentation of Scientific Papers	Program for Ladies and Children	
	4:30 P.M. Join Ladies and Children to 6:30 P.M.		
5 P.M. Check in at Hotel Registration Convention & Social Activities			5 P.M. Check Out
6 P.M. Cocktail Party			
7 P.M. Dinner—Speakers After Dinner Entertainment			
	7:30 P.M. Dinner, Awards, etc.		

NUTRITION AND THE ORAL MECHANISM†

ROBERT S. GOODHART, M.D., *New York, N. Y.**

The oral mechanism is not a thing set apart from the body, but is an integral part of it. Except for the teeth, the involved tissues are structurally and physiologically similar to tissues elsewhere in the body and are similarly affected by nutritional and other factors. Practical application has been made of this fact by clinicians for a great many years, but the recent developments in clinical nutrition have prompted many dentists and physicians, alike, to pay more attention to the appearance of the mouth parts and to attach more signifiance to deviations from the healthful state.

A severe niacin deficiency may mean diarrhea, dementia and death; but, very early in this course of events, there are tongue changes such as redness, fusion of the filiform papillae, sloughing of papillae, loss of coat, baldness and atrophy of the tongue, with or without secondary infection with Vincent's organisms. In riboflavin deficiency the fungiform papillae may be unusually prominent and the tongue takes on a magenta hue. Pathology of the tongue with atrophy occurs also in iron deficiency anemias, folic acid deficiency, B_{12} deficiency, during the course of therapy with penicillin or other antibiotics and often in the aged. Similar tongue lesions have been reported to respond to pyridoxine therapy.

Abnormalities of the filiform and fungiform papillae, with fusion and multiple fissures, are common. The pathology may be very slowly progressive and may represent a manifestation of a low grade chronic nutritional deficiency, or the cumulative effects of repeated acute or subacute deficiencies. In many cases the evidence is strong that the lingual abnormalities are congenital. Frequently mother and child show similar abnormalities. It may be that prenatal malnutrition is responsible in such cases; this remains to be proven. Certainly the atrophy of the papillae and of the tongue substance in the aged is not a physiological manifestation of the aging process. It does not occur in all elderly people. It is not limited to the aged and it responds to proper nutrition therapy.

The lesions of the lips and mouth known as cheilosis and angular stomatitis, when they are of nutritional origin generally represent an acute or chronic deficiency of riboflavin, although they may occur with iron deficiency. Frequently, however, traumatic factors or allergies play a major role. Angular stomatitis may result from ill-fitting dentures, or from the lack of support of the soft structures resulting from loss of teeth. Cheilosis may occur in mouth breathers or from exposure to cold weather. Usually more than one factor is operative and, as with the skin lesions of pellagra, a nutritional deficiency should be suspected when the severity of the lesions is out of all proportion to the magnitude of any other demonstrable causative agent.

Deficiencies of niacin and of riboflavin affect the gingivae as they do the other soft tissues but, where the gingivae are concerned, vitamin C deficiency results in the most striking changes and appears to be of the most practical importance. This probably is related to the severe trauma to which the gingivae are subject and the importance of vitamin C to the integrity of the intercellular cement substance. The swollen, purple, bleeding gingivae of classical scurvy are so recognizable, and so uncommon in this country, as not to require any further discussion here. It should be pointed out, however, that the gingival changes of classical scurvy have never been observed during the experimental production of ascorbic acid deficiency in man. Scorbutic gingivae probably result from a combination of vitamin C deficiency with other factors. Trauma enters into play. Scorbutic gin-

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givitis does not appear in edentulous mouths nor, apparently, in mouths where good oral hygiene is maintained.[3a]

Vitamin C deficiency in this country is usually partial and chronic in nature, with repeated acute or subacute exacerbations. The gingival changes that develop are modifiied by infection and trauma, healing, repeated breakdowns and scarring. Often it is exceedingly difficult to determine the role played by vitamin C deficiency in any particular case. Response to ascorbic acid therapy is slow and may be non-existent, unless simultaneous measures are taken to improve oral hygiene, eradicate infection and correct traumatic factors.

Good prenatal nutrition is essential for the normal development of the bones and teeth. In experimental vitamin C deficiency in the guinea pig changes occur which have been likened to the diffuse alveolar atrophy of pyorrhea in man.[36] In experimental vitamin C deficiency in man, interruptions in the lamina dura, presumably resulting from atrophy of alveolar bones and replacement with collagen-free fibrous tissue, have been described.[3a] Derangements in the growth of the bones and teeth have been described in vitamin A deficiency and in rickets and changes in the supporting structures of the teeth occur in rickets and in osteomalcia. But the relation of ascorbic acid, vitamin D, vitamin A or calcium and phosphorous to dental caries is not clearly understood. Many other factors enter into the production of dental caries.

McBeath and Verlin[8] and others have reported beneficial effects upon the incidence of dental caries by the use of adequate amounts of vitamin D (particularly in the animal form) in children more than eight years of age. Boyd[2] found, in a study of teen-aged diabetic children, that tooth decay could be prevented or arrested by the use of diets designed to meet optimal nutritional needs. He was unable to attribute the favorable effect of the dietary regimen to any single constituent or characteristic of the diet. On the other hand, Ziskin, Siegel and Laughlin[12] found no significant reduction in the incidence of tooth decay in diabetic children and believe that their fiinding minimizes the theory that caries of the teeth may be controlled by nutritional means, by way of the general metabolism. These authors quote other workers to the effect that no relationship exists between vitamin B complex, or vitamin A, or vitamin C deficiency and tooth decay. Siegel, Waugh and Karshan[11] studied the calcium, phosphorous and nitrogen metabolism of Eskimo children with and without dental caries and concluded that their studies provided no basis for the view that the freedom from caries enjoyed by primitive people is due to a nutritional superiority of "natural" as compared with "civilized" diets.

The above is only a small example of the voluminous literature on the relation of nutrition to dental caries, selected simply to illustrate the lack of unanimity among investigators in this field. For a comprehensive and critical review of the work on the relation of nutrition to dental caries reference is made to the report of the Committee on Survey of Literature on Dental Caries of The Food and Nutrition Board, The National Research Council, Washington, D. C. As a result of my own review of the literature, I find myself pretty much in agreement with Paul H. Phillips[10] who has pointed out that there are two periods when nutrition profoundly affects the tooth.

The first of these is during the formation of the tooth. During this period it is necessary to provide ample amounts of the essential materials for tooth formation (protein, calcium, phosphorous, the B vitamins and vitamin A, D and C). "This step is most important during the preschool and early school age. It is all too late to hustle into a nutritional program to develop good teeth after a child is eight to ten years old."

Once a sound tooth is formed, the next step in the prevention of caries is to set up conditions unfavorable for acid forming organisms and for the action of acids upon the tooth. Diet is important here. Phillips lists the following factors as

having been found experimentally to be important in their effect upon dental caries:

"(a) Mechanical failures causing imperfections in the formed enamel.
(b) Dilution effect.
(c) The creation of unfavorable oral environments for caries-producing bacteria, for example the effect of pH, ion balance, and the use of foods resulting in either a net acid or base balance.
(d) Use of non-fermentable sugar foods.
(e) The avoidance of factors which favor caries production."

Both nutrition and diet have an important bearing on dental caries. The nutritional status of the individual being of the greatest importance during the early years of life and the local effects of the diet upon the environment of the tooth coming into the ascendancy with tooth eruption.

There are many who believe that the action of fluorides in preventing dental caries may be as much a systemic as a local one. Fluorine may be an essential nutritional substance. McClendon and Foster[9] have reported that rats raised on fluorine-free diets give birth to fewer young and the mothers provide less milk. In addition such rats show extenesive decay of the molar teeth. However, that the action of fluorine on dental caries is primarily local is indicated by the beneficial effects of topical applications of fluoride,[7] by the beneficial effects of ammonium salts[5] and of dietary oxalate,[4] by the demonstration that fluid diets are less cariogenic than dry rations,[1] and by the prevention of experimental tooth decay by tube-feeding.[6]

CONCLUSION

The growth and health of the oral mechanism is dependent upon genetic factors, nutrition, and the nature, frequency and severity of deleterious environmental factors. In a mixed population, such as ours, high resistance to disease on a genetic basis is far from the rule and it becomes extremely important to insure good nutrition and to minimize exposure to traumatic environmental factors.

150 Broadway.

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THE DENTAL-MEDICAL ROLE OF VITAMIN B_{12}

ELEANORE CORNISH, D.D.S.†

"A purification of clinically active liver fractions has led to the isolation of a compound called Vitamin B_{12}."[10] What is the story behind the countless hours of persistent research, which has made this statement possible? What led to its investigation and of what value would it have in aiding mankind?

The parts of the human body which are especially concerned in these investigations under physiological and pathological conditions are the liver, stomach and circulatory hemopoietic systems, particularly the bone marrow.

PHYSIOLOGIC AND PATHOLOGIC CONSIDERATION

Maximow and Bloom[7] state that the main function of the bone marrow is the production of myeloid elements of the blood. There is only a slight variation under physiologic conditions between the cellular composition of the blood and that of the marrow. The production of erythrocytes depends in part on an anti-anemic factor, which is stored in the liver. It is believed that this factor is the result of the interaction of a substance in the gastric juice with some substance in the diet, the former being referred to as the intrinsic factor and the latter the extrinsic factor. It might be said that the liver acts as a storehouse for the maturation principle.[2]

However, under all general pathological processes the composition of the bone marrow is immediately affected.[1] The myeloid tissue is dominated by erythrocytes and their precursors. If for some reason the anti-anemic principle is lacking, the normal maturation of the erythroblasts to normoblasts is interfered with, and a large primitive red cell megaloblast is formed. Some of these are found in the bloodstream with other immature forms of red cells. The average size of the circulating red cell is large and usually contains more hemoglobin than a normal cell. Despite this, however, on clinical examination it will be found that the percentage of hemoglobin is low due to the great reduction in the number of red blood cells. The absence of the anti-anemic factor results in a condition known as pernicious anemia, given this name because before a cure was discovered in 1926 by two Boston physicians, Minot and Murphy, it resisted all forms of treatment and invariably caused death. The highest incidence of this disease is in middle life; a case has rarely been reported before the age of thirty. We find atrophic changes affecting the epithelium of the tongue and the mucous membrane of the stomach, particularly the proximal two-thirds, with the disappearance of the parietal and peptic cells. Achlorhydria is usually present. Occasionally fatty degeneration takes place in the liver and kidneys and more often in the heart. The hemopoietic tissue of the bone is hyperplastic, and the yellow fatty tissue normally found in the long bones is replaced by deep red marrow. A few cases are complicated by diffuse symmetric degenerative lesions in the dorsal and lateral columns of the spinal cord, but rarely is there similar degeneration in the brain. Lesions are, however, found in the peripheral nerves.

Cecil in his classic *Textbook of Medicine*,[5] gives a clinical picture of the tongue as usually appearing red and smooth, often with absence of papillae. At times there are vesicles due to the loss of epithelial covering and occasionally white shallow ulcers. There is atrophy of the mucous membrane and underlying muscle. It is significant that about one-third of the present day patients examined and found to have pernicious anemia in relapse have abnormalities of

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the lingual mucosa, with or without hematologic or neurologic manifestations. It should be kept in mind in differential diagnosis that mucosal changes of similar appearance may result from a lack of vitamin B in the diet, iron deficiency, use of oral penicillin, association with serious hepatic disease or abdominal neoplasms, etc. Symptoms of neural disturbances are usually first detected by a gradual loss of vibratory sense in the lower limbs. Ataxia, absent reflexes and hypotonicity show degeneration of the posterior column whereas spasticity especially of the legs, exaggerated reflexes, and hypertonicity show degeneration of the lateral column. Pernicious anemia may occur in families. Near relatives should have their gastric secretion and blood checked at regular intervals.

EARLY INVESTIGATIONS

In 1885, Addison wrote in his description of pernicious anemia that "it makes its approach in so slow and insidious a manner that the patient can hardly fix a date to his earliest feeling of that languor, which is shortly to become so extreme."[8] Lichtheim in 1887 was the first to describe degenerative lesions of the nervous system. The clinical course, signs, symptoms, and the pathological changes of this disease were all well known, but there was no adequate treatment.

Whipple[8] in his investigation in 1922 postulated that this might be a disease of the stroma-forming cells of the bone marrow. Minot suggested that liver would enhance the blood formation. Minot a diabetic, whose life was prolonged by the timely discovery of insulin, was the first to treat pernicious anemia successfully. Not only did Minot wish to eradicate the symptoms and place them under control, but also to restore the patient's nutritional state to normal for the rest of his life. He wanted to return the hemoglobin and the blood cells to their normal levels, keep them there, and maintain a normal color index, cell size, and cell volume. In feeding liver intensively to their patients, Minot and Murphy found that within sixty days the red blood cell count had almost reached normal. Liver in sufficient quantity to maintain this desired level taxed the appetite of even the most enthusiastic patient. To offset this difficulty liver extracts were manufactured. A more rapid response was noticed in the return of normal lingual mucosa. Filiform papilla sprouted from a smooth tongue in five to seven days and attained normal height in two to three weeks. In time, however, it was apparent that the liver extracts varied in their hemopoietic activity according to the source of material and the method of extraction. It was found also that the action of the extract was inhibited by infections, increased metabolism, arteriosclerosis, etc. In addition, cases of sensitivity to the extracts were reported with sufficient frequency for it to be a serious medical problem.[9] During this time Cohen, West, Dakin and Ungley worked tirelessly on the problem of isolation and partial purification of a product from liver, which would be effective in the treatment of pernicious anemia. They were not alone in their search — Strandell of Scandanavia and Karrer of Switzerland worked unceasingly without success. The next step was a report of a new member of the vitamin B complex, pteroylglutamic acid or commonly known as folic acid, which was effective in producing blood regeneration in macrocytic anemia.[12] Eventually this was discontinued as a therapeutic agent due to its failure to maintain a slight improvement in patients with neurologic disturbances and to protect them against relapse. The blood picture as well was not too satisfactory. At the beginning of therapy, reticulocytosis although prompt was often not as active as hoped for. Macrocytosis in some cases persisted for months and the blood values declined during maintenance therapy. And so the search was relentlessly pursued. Castle of Harvard and Minot in discussing the etiology of pernicious anemia with reference to hematologic, gastrointestinal and central nervous systems long ago said, "until the hematopoietic principle of liver is isolated, it will be impossible to find

by a therapeutic test whether it is also specific for neural disturbance, or whether multiple factors, intrinsic or extrinsic are involved." The problem of isolation of the principle presented two difficulties:

1. A lack of any reliable assay method to guide fractionation.

2. A lack of sufficient numbers of untreated patients for testing the fractions resulting from various attempts at purification aided the time consuming element in the necessity of direct collaboration between clinician and chemist.

VITAMIN B_{12}

From 1942 clinical tests on purified fractions in the Merck Research Laboratories showed steady improvement. Shorb in 1947 reported finding in liver extracts a growth factor required by lactobacillus lactis Dorner bearing in concentration an almost linear relationship to the unit potency of the extracts used in the treatment of pernicious anemia. For convenience in testing of the fractions an arbitrarily selected standard liver concentrate was assigned a potency of 1000 L.L.D.-units/mg. This seemed to provide the long sought-for stepping stone for the assay method, and Rickes, Brink, Koniuszy, Wood, and Folkers of the Merck Research Laboratories were able to further purify clinically active "liver fractions."[11] A red crystalline compound was isolated, highly active for the growth of lactobacillus lactis Dorner and with a potency of eleven million L.L.D.units/mg.

The new compound was provisionally termed vitamin B_{12} by the scientists, a name with only nutritional significance, since the biological role of the new compound in the treatment of pernicious anemia is not completely understood. Eight days after the Merck publication, British workers Smith and Parker of the Research Division of Glaco Laboratories announced the isolation of small red needlelike crystals from liver. Concentrates containing between 2.5 and 3.0 percent of active material were obtained by the use of the recently introduced method of partition chromatography in separating unidentified substances, particularly those which are colored. Other sources of the material are fish meal, egg white, egg yolk, alcoholic extract of whey, gelatin, soybean oil meal, etc.

Upon chemical analysis the vitamin was found to be a cobalt coordination complex which has six groups about the cobalt atom. Smith the British investigator detected the presence of cobalt by the characteristic cobalt borax bead test and by the specific red color reaction with nitroso salt. The molecular weight of vitamin B_{12} is 1.5000. The presence of cobalt in an isolated compound of natural origin is important when it is remembered that cobalt is an essential trace element in nutrition, and more particularly in the evaluation of suggestions concerning the role of cobalt as a trace contaminant in iron therapy of anemia.

The empirical formula is as follows:

carbon	—	61-64
hydrogen	—	86-92
phosphorous	—	1
cobalt	—	1
nitrogen	—	14
oxygen	—	13

and the standard formula is 5, 6 dimethyl-benzimidazole which is similar to that of riboflavin.

Aqueous solutions of vitamin B_{12} are stable during autoclaving for fifteen minutes at 121°C., but inactivated at room temperature by .015 M NaOH to the extent of twenty percent in forty minutes and ninety-five percent in ninety-five hours, and by 101 M Hcl by fifteen percent in three hours and eighty-nine percent in ninety-five hours.

It has been found that with the use of vitamin B_{12} a rise to peak in reticulocyte level occurs within five to nine days.[4] The red blood cell count and the hemoglobin content approach normal within two months. The leukocyte and platelet counts return to normal much more rapidly. After a single injection, megaloblastic bone marrow becomes normoclastic within forty-eight to seventy-two hours. Vibration and position sense, and superficial pain reception are restored. Tendon reflexes are improved, and the patient is

able to walk unaided. Neurological responses have occurred within a period of four days in three months.

Cobione[10] is the trade mark of Merck and Company for its brand of crystalline vitamin B_{12}. There has been no evidence reported to date of any irritation following administration of the saline solution.[6]

The dosage varies with individual cases, depending upon the severity and duration of the condition and the therapeutic response of the patient. The minimum effective dose is approximately one microgram per day, but it can be administered in as large amounts as fifteen to thirty micrograms once or twice a week. The maintenance dosage is fifteen micrograms. Cobione is supplied in ampules, each of which contains sufficient solution to permit the withdrawal and administration of one c.c. Each c.c. of solution contains fifteen micrograms of crystalline vitamin B_{12}.

Eakin and Shive of the University of Texas have isolated a substance which will allow patients to take vitamin B_{12} by mouth instead of by injection. The substance is called apoerythein and permits the body to absorb vitamin B_{12} through the stomach.

Vitamin B_{12} is present in the liver in such small amounts that it would take 1500 tons to yield one ounce of substance. Shorb has proven that vitamin B_{12} can be produced by bacterial fermentation. A red crystalline compound produced by Streptomyces griseus paralleled vitamin B_{12} clinically and chemically.

Interest has been focused almost entirely on the hemopoietic activity of vitamin B_{12}, but further studies have been carried out evaluating the growth effect[13] of orally administered vitamin B_{12}. Ten micrograms daily were administered to children exhibiting growth failure due to simple malnutrition or that which resisted intense efforts to resolve it. Definite growth increases were found. An unforeseen factor appeared in these experiments when a child who had been suffering from severe extreme allergic bronchitis for one year, within the first week of injections became free of the symptoms. However, further investigations will have to be done before the administration of vitamin B_{12} is adopted generally as a treatment for allergy.

CLINICAL INVESTIGATION

At the College of Dentistry of New York University, a research problem is being carried out by the Department of Periodontia. Patients are selected whose chief complaint is burning mouth, either tongue or palate. A careful thorough examination of the mouth and complete blood analysis are carried out before any treatment is given. The outline of the history sheet is as follows:

1. Family history (personal and emotional) in this a clue may be given to an underlying etiological factor such as constant worry, a feeling of insecurity in the home life, cancerophobia and hereditary disease.
2. Onset of the condition.
3. Condition of the temporomandibular joint.
4. Present oral findings exclusive of the tongue.
5. Dissimilar metals in the mouth.
6. Menstrual or sexual history.
7. Evaluation of diet history.
8. Hematologic conditions. This part of the chart is of particular value and is well detailed. Earch column contains the normal value for the blood cell with space for four subsequent determinations.
9. Complicating conditions such as mouthbreathing.
10. A detailed map of the tongue on which the present clinical picture can be drawn with its record of response to treatment. The objective signs and subjective symptoms and any notable changes are recorded along with dosage both in the clinic and at home.

Two typical cases histories are here presented:

Case I:

White female age sixty, occupation housewife, presented for treatment with chief complaint of dry mouth, burning tongue, and burning palate. This condition had persisted for ten years, and was

first noticed by the patient after the insertion of vulcanite dentures. Her dentist assured her that this sensation would pass away in time. Five years ago the vulcanite dentures were changed to acrylic. The patient claimed that the condition was slightly relieved by the removal of the upper denture. She gave a history of a happy stable home except for the tragedy of a son, who was born mentally deficient and is now in an institution. The general condition of the mouth on examination was good. Five teeth were present in the upper jaw, upper right cuspid to upper left lateral. In completion of treatment these were extracted. The patient began to menstruate at the age of eleven and reached menopause at fifty. Her medical history contained only the condition of arthritis in the knees and shoulders and by physician's instructions she had been taking lemon juice in hot water twice daily for the past eleven years. Hematologic determinations revealed:

erthyrocytes	3.5 million
leukocytes	5.450 thousand
basophiles	1 percent
eosinophiles	1 percent
lymphocytes	37 percent
neutrophils	
bands	2 percent
segmenteds	53 percent
monocytes	6 percent
hemoglobin	10.5 grams percent

On April 14, 1950, examination revealed the tongue to be large and pink with two glossy areas. A burning sensation was present in the anterior one-third of the dorsum of the tongue. The patient received fifteen micrograms of vitamin B_{12} by injection intramuscularly with instructions to take five micrograms orally on alternate days. There was improvement after the first treatment, and the patient began to lose the burning sensation. Injections were discontinued on April 18, 1950, but daily oral administration was continued at home. There was at this time two small areas of desquamation in the midline, and on the left anterior one-third of the dorsum of the tongue. When last seen April 20, 1950 the patient claimed to be fully relieved and there were no areas of desquamation on the dorsum of the tongue. She was given a maintenance oral dosage of five micrograms daily.

Case II:

White female age thirty-seven, occupation housewife, presented for treatment with the chief complaint of burning tongue and palate, duration of a little over two years. Patient has two children, husband is living and parents deceased. The patient's mother died of cancer. This has played a big role in contributing to the patient's mental confusion because even though she has been assured that there is no cancer, she feels that there must be because she has had no relief from the burning sensation, and has tried all types of treatment without success. The patient believed that she can trace the beginning of her ailment to the eating of a hot pancake. There was no disturbance in the temporomandibular joint, but a yellow discoloration of the oral mucuosa was observed at the junction of the hard and soft palate. Menstruation began at the age of thirteen; the periods are regular and there is no tension at this time. Both pregnancies were normal. Hematologic examination revealed:

erythrocytes	3.9 million
leukocytes	6.4 thousand
basophiles	0 percent
eosinophiles	2
lymphocytes	51
neutrophils	
bands	2
segmenteds	41
monocytes	4

Examination of the mouth on March 6, 1950 revealed a large red tongue with pain in the palate and upper anterior gingivae. The patient claimed that she had received eight injections of vitamin B_{12} from a physician eight months previously. She received an injection of fifteen micrograms of vitamin B_{12} intramuscularly. On subsequent visits the patient complained that the tongue pained daily but of shorter duration. On March 9,

home treatment of brewer's yeast six tablets daily were prescribed by the patient's physician. On March 11, the brewer's yeast was discontinued, and the vitamin B_{12} injections were changed to oral tablets of five micrograms dosage daily. At this visit the red color of the tongue had disappeared, but the fungiform papilla were less pronounced, the pain was less and the patient felt better. The patient's cancerophobia has played a large part in her case for even when she feels better she is not convinced that a cure can be the end result.

Although the extent of clinical usefulness of vitamin B_{12} has not been completely investigated, the preliminary studies show that it may be effective in the treatment of burning tongue and burning palate. The studies may indicate that vitamin B_{12} is acting on the whole gastrointestinal tract.

Recently Castle of Harvard, Norris and Majuarich of the University of Washington stated that they believe the intrinsic factor consists of several enzymes, which are secreted by the stomach and the liver while the extrinsic is folic acid, vitamin B_{12} or a similar substance. The two factors react to form vitamin B_{14}, which they believe to be the anti-anemic factor. Vitamin B_{14} has now stepped into the picture, and may in some respects replace vitamin B_{12}.

In a recent issue of the Journal of Nutrition, Bosshardt, et al. has suggested that vitamin B_{12} may play a role in the catabolism of carbohydrates, or the carbohydrate-like residues of protein, or in the conversion of intermediates formed in the metabolism of carbohydrates and proteins to fats.[3]

CONCLUSION

The isolation of vitamin B_{12} has perhaps been of little over-all importance, but it is a step forward and upward in a long series of successful investigations in the field of vitamins of the B complex. Further clinical observations of the affects of vitamin B_{12} are essential before its true value can be determined.

SUMMARY

1. Vitamin B_{12} has been found so far to be the most effective agent in the treatment of pernicious anemia. In cases of macrocytic anemia of pregnancy folic acid is the drug of choice.
2. Cases of glossopyrosis have been successfully treated with vitamin B_{12}
3. It is believed that vitamin B_{12} has an active relationship on human growth and metabolism.
4. Minimum dosage of one microgram of saline solution of vitamin B_{12} daily provides an adequate therapeutic response.
5. Vitamin B_{12} can be administered intramuscularly or orally as desired.

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ABSTRACTS

ELECTRON MICROSCOPY*

CECIL E. HALL, M.A., Ph.D, *Cambridge, Mass.*†

In the ten years since the electron microscope first became generally available in this country, instruments have been improved and simplified and techniques for the preparation of materials have been developed to the point where it is now a proven instrument for research on the structure of materials in almost every branch of science. Although it was evident at the beginning of this period that the new instrument was capable of providing useful magnifications up to two hundred times that of the best light microscopes, serious difficulties were encountered at first in the examination of biological materials, because the conditions for observing specimens with electron beams are quite different from those in light microscopy. Before the full potentialities of the electron microscope could be realized in practice, new methods of preparing materials for examination had to be developed and discovered. Some of the special techniques by which most of the major difficulties have now been overcome were described. Photographs were shown of virus particles, bacteria, muscle and other tissues, demonstrating the accomplishments of electron microscopy in the fields of biology and medicine. It is even possible to photograph some of the larger molecules of proteins which are the chief constituents of living substances. Electron micrographs were shown of protein crystals where in the molecules are arranged in regular patterns which can be measured to obtain accurate values for the size and shape of individual molecules.

* Author's abstract of paper presented at the Annual Meeting of the American Academy of Dental Medicine, Boston, June 24, 1950.

† Associate Professor of Biophysics, Massachusetts Institute of Technology.

RECONSTRUCTIONAL ASPECTS OF ORAL PROBLEMS OCCURRING DURING GROWTH AND SENESCENCE*

LOUIS ALEXANDER COHEN, D.D.S., *New York, N. Y.*†

The objective of restorative dentistry is to maintain, by prevention and repair, an existing normal occlusion throughout life. When, because of disease, accident and unfortunate neglect this balance is upset, the dentist is faced with the problem of restoring a disrupted masticatory mechanism so that it may again have the opportunity of functioning physiologically for that particular individual. To achieve this objective, the restorative measures needed may require the use of artificial aids far in excess of those used in the preventive and maintenance phase used to preserve the masticatory apparatus.

The fewer teeth that remain in a mouth to be used for a major restorative procedure of the occlusion, the more we face a reduced potential for survival. Certainly such teeth may be called upon to function and carry loadings in excess of their original roles in the arch relation-

* Author's abstract of paper presented before the American Academy of Dental Medicine, December 3, 1950.

† Assistant Clinical Professor of Dentistry, Columbia University.

ships. This, very fortunately, is an ability they are able to sustain and therefore the opportunity must not be lost. Teeth may need to be braced and supported, the stronger teeth supporting those that have been weakened. Forces must be changed to lessen the blow on individual teeth. Force must be carefully and equitably distributed to all the remaining natural teeth. When too few teeth remain, the tissues of the edentulous areas must also help to support necessary replacements.

This means that the natural positions of the teeth in mutilated occlusal relations may be in disbalance. If such teeth are involved with periodontal disease, the teeth must not be accepted as a functioning unit because the teeth, *per se,* are anatomically sound. This is also true if adequate treatment of the soft tissue involvement results in a favorable response.

Such an approach to the problem does not protect the patient or produce the same clinical response as does the grinding and resurfacing of such teeth to a new occlusion.

Unfortunately, we see very few mouths which are perfect physically and remain so throughout life. Almost all mouths receive some restorative dentistry. Restorative dentistry must not only solve technics and develop the skills of all of us to achieve properly adequate interproximal restorations, but must also solve the more complex problems of complete mouth rehabilitation. In the first instance, poor selection of materials or mismanagement with the best of materials may initiate detrimental changes in the occlusion. A single interproximal restoration inserted and left in supra or infra occlusion, or, in plus or minus contact, can disturb the entire occlusal relationship. The use of methyl methacrylate resin as an occlusal restorative material is to be decried. This material wears rapidly and occlusal changes invariably will be noted which are cognizant of the role of continuous tooth eruption, the anterior component of force, attritional wear, habits, both masticatory and non-masticatory, together with the mechanical considerations of the chewing stroke and the cuspal guidance in occlusion. These are some of the factors that are influencing and may possibly be helping to induce the periodontal breakdown of individual teeth, and quite probably the many temporomandibular afflictions with which we must deal.

The normal naturally occurring occlusion develops slowly and as growth and function take place, should form itself into an acceptable physiologically functioning masticatory unit. The range of adaptability of our tissues allows for variations which possess a high potential for survival. Interference with this set of natural teeth, by repair and maintenance with artificial substitutes, must also allow for the variance of the human effort by the dentist. Here again the ability of the tissues to adapt themselves to change is of inestimable value, otherwise many of our efforts would fail. Unfortunately this tissue ability is at times taxed beyond this capacity. And as a result the effort which was geared to helping and restoring the mouth in reality initiates a pathological process.

All hopelessly diseased teeth should be removed, particularly periodontally involved teeth which are not critically important to the maintenance or support or restorative replacements. The saveability of a tooth *per se* is not the objective we should seek. In attempting the preservation of a physiologically functioning occlusion throughout life, the existing destructive forces should be eliminated, and the potentially pathologic factors recognized. The remaining usable teeth should be evaluated not only on their ability to return to health, but also that upon such return to health they so remain and still bear the additional burden of replacements.

654 Madison Ave.

ENDOCRINOLOGICAL RELATIONSHIPS TO ORAL PROBLEMS IN THE LIFE CYCLE*

ABNER I. WEISMAN, M.D., *New York, N. Y.*

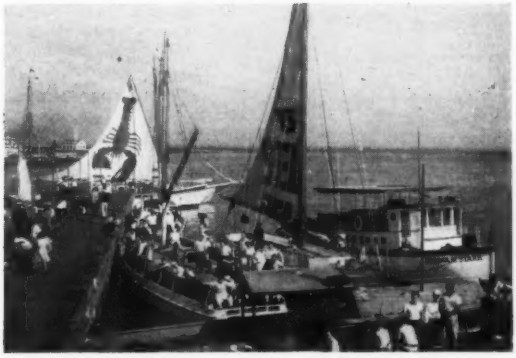
There is a close and consistent correlation between the dental development and the general physical evolution of the individual. There are many factors involved in general body growth and in subsequent senescence. Among them are the hereditary, environmental, nutritional and endocrinological factors.

Of enormous clinical significance, is the endocrine system. And since the endocrine glands are probably most active at the time when oral structures are being permanently formed, a knowledge of the glands of internal secretion is of paramount importance to dental specialists.

Various glandular hypoplasias and hyperplasias are manifest to the dentist much earlier than to the medical clinician. Because of this, the oral specialist can often anticipate subsequent general pathology and recommend to the patient that he consult with his family physician. Deficiencies of the thyroid, pituitary and the gonads are often first predicted at a casual visit to the neighborhood dentist. From the various dental abnormalities and structual defects concurrent with deficiency in endocrine secretions, clues are found for remedying general constitutional inadequacies.

The medical practitioner, conversely, when diagnosing endocrinopathy is in a position to suggest remedial dental work before oral destruction progresses beyond the repair state. A thorough analysis of the various endocrine defects as related to oral development is dwelt upon in this paper, which should lead to better diagnosis and treatment.

* Author's abstract of paper presented before the American Academy of Dental Medicine, December 3, 1950.



A boat trip is planned for women and children.

A.A.D.M. FIFTH ANNUAL MEETING

(see page 58)

BOOK REVIEWS

The 1950 Year Book of Dentistry. Edited by Hamilton B. G. Robinson, D.D.S., Donals A. Keys, D.D.S., Carl W. Waldron, M.D., D.D.S., Stanley D. Tylman, D.D.S., George R. Moore, D.D.S., and John W. Knutson, D.D.S., Chicago, Ill. The Year Book Publishers, 1950. 525 p., 384 ill. $5.00.

How often does the busy practitioner have pangs of conscience about neglecting his dental literature? As past issues pile up the task becomes discouraging and is frequently given up.

The publishers of The Year Book of Dentistry must have had benign thoughts for some of us when they planned their publication. Here we have a condensed version of the best articles published from August 1949 to August 1950. Culled from many journals, edited by experts such as Tylman, Keys, Knutson, Moore, Robinson, and Waldron, the material is meaty and timely.

All articles have been grouped under the headings of the various appropriate specialties, making it simple to study work of special interest in logical sequence without searching through an index. Domestic and foreign periodicals have been included.

Editorial notes are plentiful; clarifying, discussing or questioning stated opinions. The average abstract runs one page in length. Subject headings as listed in the table of contents are Diagnosis, Pulpal and Periodontal Diseases and Related Pathology, Caries, Public Health, Dentistry for Children, Orthodontics, Surgery, and Restorative and Prosthetic Dentistry. Here is a pleasant and satisfying way to keep abreast of current literature.

A. N. A.

Principles of Orthodontics. (Second edition). J. A. Salzmann, D.D.S., Philadelphia, Pa. J. B. Lippincott Co., 1950. 887 p. 533 ill. $15.00.

This book is written for the general practitioner, the specialist in the field of orthodontics, the student and for those interested in the development of the jaws.

There have been many new developments in the orthodontic field in recent years and these are included and explained in this second edition of Dr. Salzmann's text. The newer concepts and techniques are evaluated and discussed on a theoretical and practical basis. The biologic factors concerned in proper prevention and treatment of oral deformities are dealt with in an understanding manner. The principles of treatment are fully and clearly outlined for all to understand.

The author knows his subject and the results of his many years of practice are offered in this book.

The extensive and excellent bibliography is a worthwhile addition to each chapter and serves as a fine reference to the many quotes of the author. The mechanics of the book are good, bold print on coated paper makes for easy reading.

All who are interested in this phase of dentistry should include this book in their library. Much benefit may be derived from its careful reading.

L. R. B.

Regional Dermatologic Diagnosis, A Practical System of Dermatology for the Non-Specialist. By Ervin Epstein, M.D., Philadelphia. Lea & Febiger, 1950. 328p., 148 ill. $6.00.

This illustrated manual gives a working knowledge of diseases of the skin. It circumvents the use of technical terms and confusing descriptions that abound in formal texts of dermatology. The anatomical basis for diagnosis simplifies everyday practice. For instance, only certain dermatoses occur on the elbows, and psoriasis is most common. Under each anatomical region the chapter is subdivided into sections on inflammations, granulomas, tumors and so on. A brief description of the special disease entity is presented and effective therapy formulated. Symptom diagnosis is the approach but specific therapy is stressed. The one, of course, depends upon the other and the author does an admirable job of guiding accurate diagnosis by this clinical means. The book is well written, beautifully illustrated and up-to-date.

I. NEWTON KUGELMASS

Endodontia, The Clinical Pathology and Treatment of the Dental Pulp and Pulpless Teeth. By Edgar D. Coolidge, B.S.,M.S., D.D.S. Philadelphia, Pa. Lea & Febiger, 1950. 300 p., 355 ill. $6.00.

Dr. Coolidge in his book "Endodontia" has written an excellent volume for the student and practicing dentist. It testifies to the fact that tremendous progress has been made in the field of pulp pathology and root canal treatment. An ever-increasing number of practicing dentists are showing an interest in saving the natural dentition from mutilation by unnecessary extractions. This book adds stature to Endodontia, which is rapidly becoming one of the fields of specialization in dentistry.

Dr. Coolidge's book is lucid and well organized. While specific procedures and techniques are outlined clearly; the basic principles are stressed. This emphasis on principles is, in the reviewer's opinion, an indication of the increasing maturity of Endodontia. When the principles are understood, the techniques involved become clearer and easier to master.

As an example of this approach on the "principle" level we find excellent chapters on:

Therapeutic Principles: Anatomy of Root Canals with Relation to Pulp Removal and Root-Canal Filling; Principles and Technique of Filling Root Canals: Healing and Repair After Pulp Removal and Root-Canal Filling; Focal Infection.

Finally there is a chapter on "Pulpless Teeth" which sums up the history and philosophy of Endodontia.

This book describes the principles which establish Endodontia as a rational treatment and outlines the procedures which have proven successful. As such, "Endodontia" is a worthwhile edition to the literature.

M.A.

Periodontia. Clinical Pathology and Treatment of the Periodontal Tissues. By Edgar D. Coolidge, D.D.S. and Maynard K. Hine, D.D.S., Philadelphia, Pa. Lea & Febiger, 1951. 318 p., 378 ill. $6.00.

This book presents the major aspects of periodontal diseases and their treatment. It is a welcome addition to the growing list of textbooks on this most important speciality of dentistry.

The widely spread manifestation of these diseases and the enormous loss of teeth thus affected, make it essential that those who are atracted to this service must understand fully the intricate relation of systemic to local disorders. They must perfect their skill in controlling the inflammatory reactions in the supporting tissues of the teeth. To aid periodontists in furthering their abilities, and to guide dental practictioners and students, is the purpose of this authoritative work.

A striking point of this book is its complete documentation. Few statements of other authors are presented without complete reference, nor are dissenting opinions omitted. This is of aid to the student. The authors present their treatment on the basis of pathological changes which is an effective procedure; it leads, however, to some repetition of technics in various sections of the book.

The discussion of effects of occlusal stress upon the periodontium is complete and clear. A more comprehensive presentation of the technic of occlusal equilibration would have been welcome. Detailed drug and surgical methods for pocket eradication are complete. In the chapter on "Gingivitis Caused by Infection" the emphasis on the need for removal of irritants in addition to the use of penicillin therapy is an example of the completeness of technics employed.

A chapter of particular interest is "Gingivitis Associated with Systemic Disturbances." The relation of systemic diseases to oral symptoms are explained, and treatment offered in a concise manner but with clarity. The inclusion of "Miscellaneous Oral Conditions," (not of periodontal nature) in this chapter is an aid to proper diagnosis.

J.L.B.

For the children—a treasure hunt on the beach.

ATLANTIC CITY — A. A. D. M.

(see page 58)

MEDICAL VIEWS ON ORAL PROBLEMS

SWELLING OF THE CHEEK AND PREMENSTRUAL TENSION*

To the Editor: A 22 year old woman complains of unilateral swelling of the cheek eight to 10 days after each menses. The condition has persisted about eight months. The swelling is nonpainful, lasts three days and starts in the region of the molar eminence. During the course of the three days the swelling spreads down over the cheek proper and finally disappears. There is no associated discoloration of the face or other signs of local pathology. Two years ago she underwent a Baldy-Webster suspension, tubal ligation and appendectomy. Four years ago the patient had a normal full term pregnancy, and to date her periods have been normal. Results of physical examination and routine laboratory tests were essentially negative. The patient was placed on a salt-free diet, 10 grains (0.6 Gm.) of ammonium chloride three times a day and 20,000 units of estrogens every three days for five doses. She was not seen until the swelling recurred, three days prior to her next period. The swelling had completely abated by the first days of the menses. She received the same treatment the following month, and, while the swelling recurred again just prior to the period, it lasted only two days and was not as pronounced. During the third month under observation she was given 10 mg. of testosterone propionate twice daily for the first 15 days of the cycle. The patient had no swelling during that cycle. What would be the most likely diagnosis?

M.D., Ohio.

ANSWER.—The condition is part of the syndrome known as premenstrual tension. In this syndrome all types of bizzare swellings may occur in different parts of the body. The etiology of premenstrual tension has been stated to be an increased amount of estrogen in the blood before the onset of menstruation or an insufficient amount of progesterone secretion at this time. Greenhill and Freed (*Endocrinology* 26:529 [March] 1940) postulated a single mechanism for the development of the variety of changes which occur. Premenstrual distress is, according to this hypothesis, the result of sodium ion retention by the different tissues of the body under the influence of the ovarian steroids. This retention of sodium ion is associated with an increase in extracellular fluid in the tissues, which may be microscopic in amount or may develop into gross edema. Under this theory, the neurological symptoms result from edema of the nervous system, probably the brain, the nausea and bloating of the abdomen result from edema of the gut and the other symptoms arise from the specific organs affected.

On the basis of this hypothesis one would administer ammonium chloride by mouth, a salt frequently used for removal of edema fluid in cardiac and renal distrubances, although not in the usual diuretic doses. The patient is advised to refrain from adding table salt to food during the last two weeks of the menstrual cycle. During this time she is given 0.6 Gm. of ammonium chloride three times a day.

* From the J.A.M.A., Dec. 9, 1950.

STEVENS-JOHNSON SYNDROME*

According to Loewenthal and his associates, the condition which in the English literature is now generally called Stevens-Johnson syndrome has also been designated as erythema exudativum multiforme with pneumonia, ectodermosis erosiva pluriorificialis and dermatostomatitis. The cutaneous lesions probably represent an allergic reaction to a variety of substances, bacterial, fungal, viral or chemical. The condition behaves as a specific infective one, with involvement of the skin, eyes, mucous membranes and lungs. The disease may last 10 days to four weeks or more, and some survivors are left with permanent ocular damage. The authors present the histories of two patients with this disorder, a woman aged 53 and a 10 year old boy. In both patients the disorder responded within 48 hours to treatment with aureomycin, whereas sulfadiazine and penicillin therapy had failed. The favorable response to aureomycin therapy agrees with the observations reported by others, and the authors believe that aureomycin acts as a specific remedy in this disease.

* South African Medical Journal, Cape Town, Aug. 19, 1950. (From J.A.M.A.)

LEUKOPLAKIA OF THE CHEEK*

To the Editor: What is the best treatment for leukoplakia of the cheek?

Harry F. Watt, M.D., Ocala, Fla.

ANSWER.—The treatment of leukoplakia, if the patch is superficial and smooth, is one of "studied negligence." It is sufficient to employ only a bland mouth rinse and to protect the patch from irritation by such agents as roughened teeth, spiced foods and tobacco smoke. If the patch is indurated, if there is erosion, fissuring or ulceration or if papillary growths develop on the surface, the patch should be destroyed thoroughly. Surgery, electrosurgery or radiation may be used, depending on the physician's skill and training. Surgical methods, destroying or excising a small area at a time, are usually favored over radiation therapy. In addition, many physicians recommend for all cases of leukoplakia, the administration of vitamin A in large doses; others employ vitamin B preparations, liver substance and estrogenic substances. The old dictum to "look

back for syphilis and ahead for cancer" still holds true for some cases. It is important, also, that the patient be examined at intervals for many months, even years.

* From J.A.M.A., Nov. 11, 1950.

INFECTIOUS MONONUCLEOSIS AND BELL'S PALSY*

To the Editor: A 17 year old white girl complained of headache, fever, severe sore throat and lymphadenopathy of the cervical, axillary and inguinal areas. The spleen was palpable. Infectious mononucleosis was suspected, and a peripheral blood smear confirmed the suspicion. Her throat remained sore, and a membrane developed about two weeks after onset of the illness. A throat smear revealed only the usual organisms of the nasopharynx. Taste sensation was normal on the anterior surface of the tongue. The patient improved and was ambulatory in the third week; then peripheral Bell's palsy developed. What is the incidence of this neurological complication in mononucleosis? Could it be attributed to the prolonged sore throat in this case?

Paul A. Newton, M.D., Oakland, Calif.

ANSWER.—Central nervous system involvement in infectious mononucleosis is common. Serous meningitis, encephalitis, encephalomyelitis and isolated or diffuse upper and lower motor neuron lesions have been described. There are reports of spinal fluid changes, such as pleocytosis, increased pressure and increased protein in as high as 50 to 90 per cent of some series. Neurological changes most often occur two to four weeks after the onset of the disease; in occasional cases these have preceded adenopathy and lymphocytosis by as long as two weeks. Recovery from the neurological aspects of infectious monouncleosis is usually complete in one to four weeks, but rare instances of permanent damage have been observed. Five cases of facial palsy are found in the literature. In one of the first two, described by Gsell (1937), there was bilateral involvement. In another case, described by Zohman (1942) the disease was associated with diffuse lower motor neuron lesions. It seems probable that the palsy in the patient described is the direct result of the "neurotoxic" properties of infectious mononucleosis virus rather than direct extension of the inflammation from the throat.

* From the J.A.M.A., Dec. 9, 1950.

There will be time for the ladies to visit the shops along the boardwalk. Rolling chairs take passengers along the boardwalk.

THE NEW JERSEY SECTION WILL BE YOUR HOST

(see page 58)

ANNOUNCEMENTS

Special Announcement

New York University College of Dentistry

This schools offers a one year full time course covering all phases of periodontal diagnosis and treatment, including conservative and radical technics and equilibration of occlusion. Each registrant must acquire sufficient clinical experience to prove his skill in the handling of all phases of periodontal disease. He is also required to prepare an original thesis on a phase of the subject, this is to be presented before the class for discussion. Courses in periodontia are under the supervision of Professor Samuel C. Miller.

One academic year, daily, Monday through Friday, 9 A.M. to 4 P.M. Limited to 4. Tuition $1,000.00. Books $29.50. Instruments approximately $100.00. Rental fee $1.00.

IMPORTANT—Those taking this course under the G.I. Bill will be permitted to start June 11th taking the one week course and then to recontinue their studies starting Monday, September 17th.

For information and application write to Secretary of Postgraduate Division—New York University College of Dentistry—209 East 23rd Street, New York 10, N. Y.

Postgraduate Program at Ohio State

The Ohio State University, College of Dentistry, announces the following schedule for its postgraduate courses in dentistry to be presented during the spring of 1951:

April 2-6—General Anesthesia—Morgan L. Allison.
April 9-13—X-Ray—H. D. Spangerberg.
April 16-20—Full Denture Prosthesis—Carl O. Boucher.
April 23-27—Clinical Oral Pathology—H. B. G. Robinson.
April 30-May 4—Periodontia—John R. Wilson.
May 7-11—Oral Surgery—D. P. Snyder.
May 21-25—Crown and Bridge—Frank C. Starr.
May 28-June 1—Partial Denture Prosthesis—Victor L. Staffel.
June 11-15—Anatomy of Head and Neck—Linden F. Edwards.
Every Week Through May—Airbrasive Technic—John P. Beckwith & Harry H. Postle.

During the week of May 14, no postgraduate courses will be scheduled. The College of Dentistry is holding its annual Post-College Assembly on May 14 and 15, and the new Health Center of the Ohio State University will be officially dedicated on May 16.

Each course is given for five consecutive days, Monday through Friday, and the fee for each course is $50 with the exception of Oral Surgery and Airbrasive Technic which are $100 each. All of the courses have been approved by the Veterans Administration. The classes are limited to ten men each so that there is opportunity for discussion and personalized instruction.

Further information and application may be secured from the Postgraduate Division, College of Dentistry, Ohio State University, Columbus 10, Ohio.

Endodontia Postgraduate Course at N.Y.U.

PULP CANAL THERAPY 128C (continuous, mornings)

This 54-hour course which presents a practical method of treating pulp-involved teeth consists of lectures, demonstrations, and clinical treatment of patients. Emphasis is placed on: diagnosis and selection of cases; the selection and care of instruments; a practical method of establishing and maintaining asepsis; access to and preparation of root canals by means of chemicals and instruments; ionic medication; use of gutta percha and silver wires in the filling of root canals; treatment of nonvital teeth; pulp-canal therapy in diagnosis and treatment planning for complete mouth rehabilitation. These courses are under the supervision of Associate Professor Morris Cohen and Assistant Professor Morris B. Auerbach.

June 4 to June 28, 1951. Daily, Mondays through Fridays, 9 A.M. to 12 M. Limited to 10 students. Tuition $225. Instruments approximately $50.00.

Inquire: Secretary, Postgraduate Division—New York University College of Dentistry—209 East 23rd Street, New York 10, N. Y.

The Second Annual Berkshire Conference in Periodontology and Oral Pathology

Tufts College Dental School Postgraduate Division will again conduct an advanced conference in Periodontology and Oral Pathology under the direction of Dr. Irving Glickman and staff, at Eastover, a resort hotel in Lenox, Massachusetts, June 12 to 16, 1951. The conference will consist of four days of lectures, seminars, and panel discussions regarding clinical problems by outstanding teachers and clinicians in dentistry, medicine, and their related fields.

The conference faculty includes the following:

Dr. Mark Aisner, Tufts College Dental School.
Col. Joseph L. Bernier, Armed Forces Institution of Pathology.
Dr. J. Lewis Blass, N. Y. U. College of Dentistry.
Dr. Paul Boyle, University of Pennsylvania School of Dentistry.
Dr. L. A. Cohn, Columbia University School of Dentistry.
Dr. Philip L. McCarthy.
Dr. Stanley Robbins, Boston University School of Medicine.
Dr. Theodore Rosebury, Columbia University.
Dr. Benjamin Spector, Tufts College Medical School.
Dr. Frederick J. Stare, Harvard Medical School.
Dr. John Thompson, University of Illinois School of Dentistry.
Dr. David Weisberger, Harvard School of Dental Medicine.

Among the subjects to be considered are: "The Application of Hematological Findings to Clinical Diagnosis." "Clinical Evaluation of the Individual Nutritional Status." "Just What Can We Do in the Way of Systemic Treatment of Periodontal Disease." "Experimental Evidence of the Systemic Influence in Periodontal Disease." "How to Approach the Systemic Management of the Periodontal Patient." "Bacteriological Aspects of Periodontal Disease." "Virus Disease in the Oral Cavity." "Some Factors Regarding Prognosis in the Management of Periodontal Disease." "The Effect of Local Factors upon Prognosis." "Radiographic Implications in Determining Prognosis." "Application of the Principles of Neoplastic Disease to Clinical Practice." "The Principles of Healing." "A Neuro-Anatomic Analysis of the Temporo-Mandibular Articulation As a Possible Source of Pain." "The Developmental Pattern of Occlusal Interrelationships Pertinent to the Periodontal Problem." "Restoration Therapy in the Management of Periodontal Disease." "The Clinical Application of the Free Way Space in Restorative Therapy." The Incorporation of the "Concept of Centric" in Restorative Therapy."

The curriculum is arranged so that the mornings and evenings are devoted to professional activities, with afternoons open for recreation.

There will be a complete program of activities for the ladies.

CONFERENCE FEES

Tuition (payable under G.I. Bill)	$125.00
Hotel Room and Board (entire conference)	$ 75.00
TOTAL COST	$200.00
Cost for wives	$ 75.00

For further information and application write to:

The Second Annual Berkshire Conference
Tufts College Dental School
136 Harrison Avenue
Boston 11, Massachusetts.

Periodontal Disease Workshop at Michigan

The faculties of the University of Michigan School of Public Health and School of Dentistry jointly have planned a third dental inservice training course. This dental workshop will attempt an evaluation of the present accurate scientific information concerning normal periodontal tissues, along with the etiology, pathology, symptomatology, prevention and treatment of the various types of gingivitis and periodontal disease. The period selected for this workshop is September 10 through 15, 1951.

This week-long conference will utilize the workshop technic of consultant and group participation—a technic thoroughly tested previously as a means to determine fact. During the

first day of the program, and the four succeeding morning periods, lectures will be presented by well-known researchers and clinicians who will attempt critical appraisals of current information about oral histology, physiology and pathology and the etiology, diagnosis, prognosis and treatment of periodontal disease. The references used by each essayist will be duplicated for distribution at the time of his lecture. Four afternoons and the concluding day of the conference will be devoted to small-group determinations of the validity of information in specific areas of the congeries of conditions that are reflected in the health or disease of the dental investing tissues.

The five areas of information to be appraised by these evaluating groups follow:

I. Behavior of Gingival and Supporting Tissues.
II. Local Factors in Periodontal Disease.
III. Systemic Factors in Periodontal Disease (In Gingivitis, Vincent's Disease, Advanced Periodontal Conditions).
IV. Treatment of Periodontal Disease (Conservative, Surgical, Occlusal Equilibration).
V. Prevention of Periodontal Disease.

Five sets of controversial and fact-finding questions have been assembled to assist the evaluating groups during their study periods.

Further information and application blanks can be obtained by writing Kenneth A. Easlick, University of Michigan, School of Dentistry, Ann Arbor, Michigan. A registration fee of $25.00 will be collected.

Ohio State Dedicates New Building

Ohio State University's College of Dentistry will combine its annual Post-College Assembly with dedication ceremonies for its new building on Monday and Tuesday, May 14 and 15.

The College of Dentistry Building was put into full operation in January as the first unit to be completed in the new Ohio Health Center which includes also a 600-bed University Hospital, a Tuberculosis Hospital to be administered by the State Health Department, and a Mental Receiving Hospital of the State Welfare Department.

The Post-College Assembly on Monday, May 14, will include presentation of scientific essays by outstanding clinicians and members of the Ohio State faculty and will take place in the auditorium of the State Archaeological Museum, on the campus.

U. S. Senator Lester Hunt, a Wyoming dentist, will be the keynote speaker at an alumni banquet the evening of May 14 at the Neil House.

Formal dedicatory ceremonies for the modern, three-story dentistry building and the other Health Center structures will take place Tuesday morning, May 15, in the Health Center Quadrangle.

During the first month of operation in its new building, the College's dental clinic admitted 1,000 patients. Treatment is given in 120 separate cubicles, each a fully-equipped dental office, on the first and second floors of the building, which has continuous windows on the south side of the clinic area.

The Ohio State College of Dentistry now has 340 students enrolled in its four-year curriculum, which follows a minimum of two years of pre-dental studies. In addition the college is providing two-year training courses for 80 dental hygienists and 34 dental laboratory technologists.

Dr. Wendell Postle is dean of the College. General chairman of the dedication and Post-College Assembly meeting is Dr. V. C. Steffel. Dr. Hamilton B. G. Robinson is program chairman.